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ABSTRACT

Learning objectives and suggested activities, monitoring procedures and resources for the Washington K-3 Small Schools Science Curriculum are based on the rationale that "young children need the opportunity to observe, classify, predict, test ideas again and again in a variety of contexts, ask questions, explain, discuss ideas, fail, and succeed. Along the way they will manipulate ideas and materials and, to a great extent, exercise control over their own effort. They can be questioned in such a way as to suggest relationships not previously recognized or have their attention directed to unnoticed events." The curriculum is divided into seven scope areas: change, cycles, energy, environment, organisms, property of matter, and symmetry. Activities presented enable the student to: identify changes in plants and animals due to maturation: notice daily weather changes: understand seasonal changes: describe different forms of energy used in daily experience: classify things as living or non-living, plant or animal: and group objects according to color, shape, weight, size and texture. Observing, discussing, poetry and story writing, chart keeping, scrapbook making and arranging teacher-supplied pictures in sequential order are suggested as monitoring techniques. Discussions of format, goals for the Washington Common Schools, and science program goals are included. (NEC)

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October 1977

SMALL SCHOOLS

SCIENCE CURRICULUM

K-3

Reading · Language Arts · Mathematics · Science · Social Studies

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SMALL SCHOOLS

SCIENCE CURRICULUM

K-3

Scope

Objectives

Activities

Resources

Monitoring Procedures

October 1977

ACKNOWLEDGMENTS

The Small Schools Student Curriculum Materials were written by a consortium of teacher and administrators from local districts, Educational Service District 189 and the office of Superintendent of Public Instruction.

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APPRECIATION

Many educators have been involved in the development of the Small Schools Curriculum materials. Of these, Robert Groeschell, now retired from the office of the State Superintendent of Public Instruction, deserves special recognition for his insight, leadership and support in initiating the Small Schools Curriculum Project.

In order to provide assistance to small school districts, a curriculum assessment was conducted by Mr. Groeschell in the spring of 1975. The findings of this assessment pointed out the need for the development of curriculum guidelines to assist small districts in identifying learning objectives and in planning for program implementation. These findings were used to provide the basis for originally funding the Small Schools Curriculum Project.

Appreciation is extended to Dr. Charles Murray, Superintendent, and the staff of ESD 189 for providing meeting space, equipment and resources which facilitated the development of the Small Schools Curriculum materials.

Additional appreciation is given to the pilot districts and ESDs 171 and 189 for their assistance in field testing and revising the primary Small Schools Curriculum materials.

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INTRODUCTION

The Small Schools materials were developed through the cooperative efforts of three levels of educational organizations: local, regional, and state. Forty primary teachers and ten elementary principals from small districts in Snohomish and Island Counties (Arlington, Darrington, Granite Falls, Lake Stevens, Lakewood, Monroe, Snohomish, Stanwood, Sultan, South Whidbey and Monroe Christian School), developed and sequenced student learning objectives for grades kindergarten through third in five curriculum areas: reading, language arts, mathematics, science and social studies. Suggested activities, monitoring procedures and possible resources used in teaching the objectives were identified and each student learning objective was correlated to the State Goals for Washington Common Schools and to broad program goals.

On the following pages you will find the Small Schools Reading Curriculum Materials for grades kindergarten through third. Included are student learning objectives, suggested activities, suggested monitoring procedures and possible resources. These materials were developed during 1975-76, and were piloted during the 1976-77 school year in more than twenty small districts within the state. Pilot districts included the districts which originally developed the materials, as well as Methow Valley, Chelan, Entiat, Orondo, Leavenworth, Peshastin-Dryden, Washtucna, Wahluke, Royal City, Wilson Creek, Othello and Quincy. Personnel from ESDs 189 and 171 assisted with the implementation of the pilot materials by providing regional organization, coordination, technical assistance and secretarial services. Data collected from the pilot districts were used to modify the materials in preparation for publication and statewide distribution.

Original funding for the project was made available through a Title IV, Part C grant awarded to the Lake Stevens School District. Technical assistance in the development of the winning proposal was provided by ESD 189 and SPI. Since November, 1975 funds for the project have been made available through the budget of the Superintendent of Public Instruction, Division of Curriculum and Instruction. ESD 189 and the office of the Superintendent of Public Instruction have worked cooperatively to provide participating districts with curriculum assistance, organization leadership, editorial services and the publication of materials. Curriculum Specialists from Washington colleges, universities, and local school districts also assisted with the development of materials.

ORGANIZATION OF THE SMALL SCHOOLS MATERIALS

Book covers and objective pages for all Small Schools materials have been color-coded for each subject: Reading--green, Language Arts--yellow, Mathematics--blue, Social Studies--buff, and Science--pink. Following each colored objective page there are several pages which identify activities, resources and monitoring procedures which may be used when teaching to the

objectives. See page viii of this book for a more detailed explanation of the format. On that objective page all objectives for an area of the scope are identified. Within each curriculum book the objectives have been correlated to the goals for the Washington Common Schools and to the Small Schools Program Goals for that subject area.

Accompanying the Small Schools curriculum books are resource assessment booklets for reading, language arts and mathematics, grades K-3. Within each assessment booklet test items are provided for a selected number of Small Schools objectives. The suggested test items may be used directly by teachers to assess student performance, or they may serve as models for other test items to be developed by the classroom teacher.

Another booklet containing only the Small Schools objectives is available. This booklet contains objectives for reading, language arts and mathematics, grades K-8, and for science and social studies, grades K-3. Also within this booklet are the program goals and the scope for each curriculum area.

RATIONALE FOR SCIENCE ACTIVITIES

Young children need the opportunity to observe, classify, predict, test ideas again and again in a variety of contexts, ask questions, explain, discuss ideas, fail, and succeed. Along the way they will manipulate ideas and materials and, to a great extent, exercise control over their own intellectual experience. And, if not always successful through their own efforts, they can be questioned in such a way as to suggest relationships not previously recognized or have their attention directed to unnoticed events.

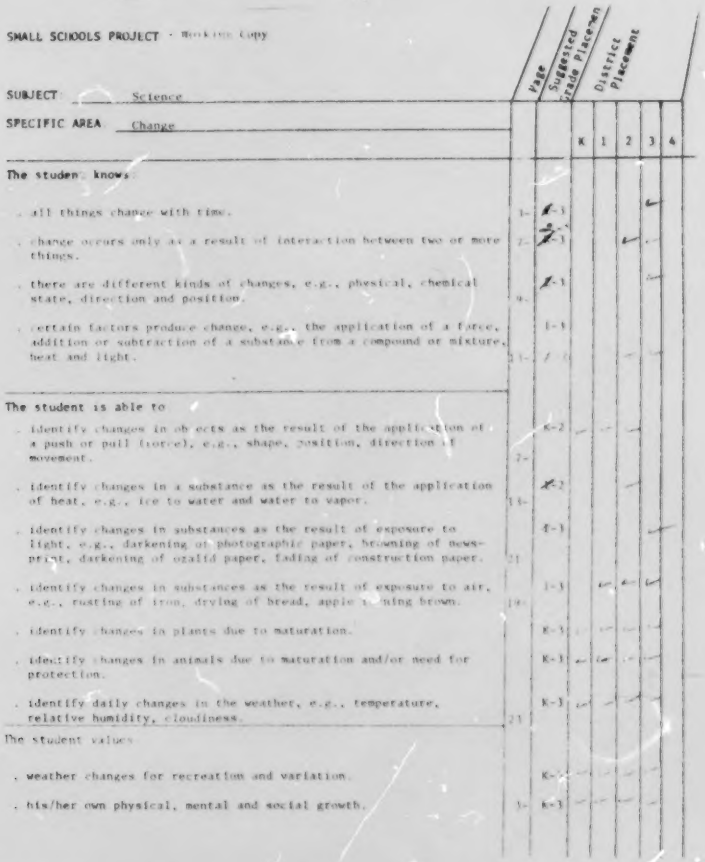
The student objectives written for the Science component of the Small Schools Curriculum Project cover a range of grade levels. Seldom is it expected that the student will fully meet the objective by the grade level listed. Instead, it is expected that these grade listings will be used as guides for subject matter placement and that the knowledge and skills identified will continue to be refined as the students continue to experience and question Nature.

One unique feature of the Small Schools Curriculum is the format or arrangement of information on the page. The format was developed in order to facilitate the transportability of the product by allowing districts to personalize the curriculum materials to meet their own educational programs. The Small Schools Format provides a simple arrangement for listing objectives and identifying activities, monitoring procedures, and resources used in teaching.

Page One

The first format page lists the sequence of student learning objectives related to a specific area of the curriculum for either reading, language arts, mathematics, science or social studies. For each objective a grade placement has been recommended indicating where each objective should be taught and mastered. The grade recommendation is made with the understanding that it applies to most students and that there will always be some students who require either a longer or shorter time than recommended to master the knowledges, skills and values indicated by the objectives.

Columns at the right of the page have been provided so district personnel can indicate the grade placement of objectives to coincide with the curriculum materials available in their schools. District personnel may also choose to delete an objective by striking it from the list or add another objective by writing it directly on the sequenced objective page.



SMALL SCHOOLS PROJECT - Working Copy

SUBJECT: Science

SPECIFIC AREA: Change

	Page	Suggested Grade Placement	District Placement K	1	2	3	4
The student knows							
. all things change with time.	1-	K-3					
. change occurs only as a result of interaction between two or more things.	2-	K-3					
. there are different kinds of changes, e.g., physical, chemical state, direction and position.	4-	K-3					
. certain factors produce change, e.g., the application of a force, addition or subtraction of a substance from a compound or mixture, heat and light.	5-	1-3					
The student is able to							
. identify changes in objects as the result of the application of a push or pull (force), e.g., shape, position, direction of movement.	7-	K-2					
. identify changes in a substance as the result of the application of heat, e.g., ice to water and water to vapor.	11-	K-2					
. identify changes in substances as the result of exposure to light, e.g., darkening of photographic paper, browning of newsprint, darkening of ozalid paper, fading of construction paper.	21	K-3					
. identify changes in substances as the result of exposure to air, e.g., rusting of iron, drying of bread, apple turning brown.	14-	1-3					
. identify changes in plants due to maturation.		K-3					
. identify changes in animals due to maturation and/or need for protection.		K-3					
. identify daily changes in the weather, e.g., temperature, relative humidity, cloudiness.	21	K-3					
The student values							
. weather changes for recreation and variation.		K-					
. his/her own physical, mental and social growth.	3-	K-3					

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Format, continued

Page Two

On the second format page, one or more objectives from the first format page are rewritten and suggested activities, monitoring procedures and possible resources used in teaching to the objective(s) are identified. The objectives are correlated to the State Goals for Washington Common Schools and to broad K-12 program goals. The suggested grade placement of the objectives and the activities is indicated and, wherever applicable, the relatedness of an objective to other curriculum areas have been shown. Particular effort has been given to correlating the materials with the areas of Environmental Education, Career Education, and the use of the newspaper in the classroom.

Below is an example of a completed second format page. Teachers and principals in local districts may personalize this page by listing their own resources and by correlating their district goals to the student learning objectives.

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows change occurs only as a result of interaction between two or more things. B. The student is able to identify changes in substances as the result of exposure to air, e.g., rusting of iron, drying of bread, apple turning brown.

State Goal	1,4
District Goal	
Program Goal	2,4

Related Area(s) _____

Suggested Activities: Grade(s) 1-2

Title: That Apple is Still Good
Group Size: entire class
Materials: apples, knife, baggies, paper towels or napkins, plastic wrap and timer

Procedure(s):

- Distribute a part of an apple to each student and ask them to take one bite of the apple. Ask students to describe the appearance of the apple where they have taken a bite. Have them set the apple on a towel for fifteen minutes.
- Cut four apple slices and tightly wrap them in plastic wrap. While students wait fifteen minutes, read them the story of Dr. Suess, Ten Apples Grow Up.
- After the story ask students to describe the appearance of their apple. Have the students bite into the area previously eaten. Ask them if the apple tastes differently. Was there any change in the taste?
- Contrast the appearance of the cut apples that were plastic wrapped. Have the students suggest what caused the difference, e.g., exposure to light or air.
- How can we find out if it was the light or air that caused the change in appearance? (Wrapped apples were exposed to light but not air.) Place sliced apple in a box with lid to keep out light. Which apple changed?
- Have students predict what change occurs in a peeled banana and potato exposed to air and light.

Suggested Monitoring Procedures

Have students describe foods such as apples, bananas and potatoes which discolor when not wrapped properly.

Possible Resources

TB: Ten Apples Grow Up, Dr. Suess

District Resources

*The abbreviations used to identify the type of resources listed in this book are as follows: TR--teacher resource; TB--trade book; NL--newsletter; F--film; Fs--filmstrip; FL--filmloop; SFs--sound filmstrip; S--slides; OT--overhead transparency; K--kit; G--game.

DEFINITION OF FORMAT TERMS
Small Schools Curriculum Project

Subject indicates a broad course of study. The subject classifies the learning into one of the general areas of the curriculum, i.e., reading, mathematics, social studies.

Specific Area indicates a particular learning category contained within the subject. Within the subject of reading there exist several specific areas, i.e., comprehension, study skills, word attack skills.

State Goal indicates a broad term policy statement relating to the education of all students within the State of Washington. In 1972, the State Board of Education adopted 10 State Goals for the Washington Common Schools.

District Goal generally reflects the expectations of the community regarding the kinds of learning that should result from school experience. These goals are employed mainly to inform the citizenry of the broad aims of the school. When district goals are correlated to student learning objectives, community members are able to see how their expectations for schools are translated daily into the teaching/learning process of the classroom.

Program Goals are K-12 goals which do not specify grade placement. These goals provide the basis for generating subgoals or objectives for courses or units of study within a subject area. Program goals are used as a basis for defining the outcomes of an entire area of instruction such as mathematics, language arts or social studies.

Student Learning Objectives

Three major types of learning objectives which have been identified are knowledge, process and value objectives.

> Knowledge Student Learning Objectives identify something that is to be known and begins with the words, "The student knows..." Knowledge objectives specify the knowledge a student is expected to learn. These objectives include categories of learning such as specific facts, principles and laws, simple generalizations, similarities and differences, etc.
>
> An example of a Knowledge Student Learning Objective is: "The student knows guide words in a dictionary indicate the first and last words on the page."
>
> Process Student Learning Objectives identify something the student is able to do, and begins with the words, "The student is able to..." These objectives are associated with the rational thinking processes of communication, inquiry, problem solving, production, service and human relationships.
>
> An example of a Process Student Learning Objective is: "The student is able to associate a consonant sound with the letter name."

Value Student Learning Objectives identify only the type of values which foster the context of the discipline. These objectives are thought to be most uniformly and consistently approved by society as supporting the major aims of the discipline.

An example of a Value Student Learning Objective is: The student values the role of plants in his/her daily life."

Suggested Learning Activities describe the behavior of both the teacher and students. The instructional strategies employed by the teacher, as well as the activities undertaken by the students, are included in this section. Each activity includes materials, group size and procedures.

Suggested Monitoring Procedures indicate informal methods for determining the progress a student is making towards the attainment of the objective. These methods include techniques such as teacher observation, student interest and attitude surveys and recording results of classroom instruction.

Possible Learning Resources indicate materials, teacher-made or commercially produced, which are needed by both the teacher and students in order to accomplish the learning activities.

GOALS FOR THE WASHINGTON COMMON SCHOOLS

1. As a result of the process of education, all students should have the basic skills and knowledge necessary to seek information, to present ideas, to listen to and interact with others, and to use judgment and imagination in perceiving and resolving problems.

2. As a result of the process of education, all students should understand the elements of their physical and emotional well-being.

3. As a result of the process of education, all students should know the basic principles of the American democratic heritage.

4. As a result of the process of education, all students should appreciate the wonders of the natural world, human achievements and failures, dreams and capabilities.

5. As a result of the process of education, all students should clarify their basic values and develop a commitment to act upon these values within the framework of their rights and responsibilities as participants in the democratic process.

6. As a result of the process of education, all students should interact with people of different cultures, races, generations, and life styles with significant rapport.

7. As a result of the process of education, all students should participate in social, political, economic, and family activities with the confidence that their actions make a difference.

8. As a result of the process of education, all students should be prepared for their next career steps.

9. As a result of the process of education, all students should use leisure time in positive and satisfying ways.

10. As a result of the process of education, all students should be committed to life-long learning and personal growth.

SCIENCE PROGRAM GOALS

1. The student values science as a way of learning and communicating about self, others and the environment.

2. The student is able to use scientific problem-solving and inquiry processes.

3. The student is able to use the conventional language, instruments and operations of science.

4. The student knows significant scientific assumptions, theories, principles, laws, facts and their cultural and historical contexts.

5. The student is able to use scientific knowledge, processes, and conventions to clarify values, examine issues, solve personal and social problems and to satisfy personal curiosity.

6. The student relates science learnings to the planning and fulfilling of personal, social and career life roles.

   A. The student realizes and takes an active responsibility for applying scientific learnings to his/her own life.

   B. The student realizes that scientific learnings relate directly to his/her actions which can affect the society, family, community, nation, world.

   C. The student realizes and takes an active responsibility for directing the relationship of science to society.

7. The student values science for its aesthetic contribution to his/her continuing personal experience.

8. The student is able to initiate personally novel ideas related to science.

9. The student is confident of his/her right to develop, hold or express conventional or unusual ideas related to science.

10. The student possesses the initiative and skill to formulate productive, scientific questions.

SCIENCE
SCOPE (K - 3)

I. CHANGE.....1

II. CYCLES.....25

III. ENERGY.....65

IV. ENVIRONMENT.....93

V. ORGANISMS.....125

VI. PROPERTY OF MATTER.....197

VII. SYMMETRY.....249

SMALL SCHOOLS PROJECT - Working Copy

SUBJECT: Science

SPECIFIC AREA: Change

	Page	Suggested Grade Placement	District Placement: K	1	2	3	4
The student knows:							
. all things change with time.	3-	1-3					
. change occurs only as a result of interaction between two or more things.	7-	K-3					
. there are different kinds of changes, e.g., physical, chemical state, direction and position.	9-	2-3					
. certain factors produce change, e.g., the application of a force, addition or subtraction of a substance from a compound or mixture, heat and light.	13-	1-3					
The student is able to:							
. identify changes in objects as the result of the application of a push or pull (force), e.g., shape, position, direction of movement.	7-	K-2					
. identify changes in a substance as the result of the application of heat, e.g., ice to water and water to vapor.	13-	1-2					
. identify changes in substances as the result of exposure to light, e.g., darkening of photographic paper, browning of newsprint, darkening of ozalid paper, fading of construction paper.	21	1-3					
. identify changes in substances as the result of exposure to air, e.g., rusting of iron, drying of bread, apple turning brown.	19-	1-3					
. identify changes in plants due to maturation.		K-3					
. identify changes in animals due to maturation and/or need for protection.		K-3					
. identify daily changes in the weather, e.g., temperature, relative humidity, cloudiness.	23	K-3					
The student values:							
. weather changes for recreation and variation.		K-3					
. his/her own physical, mental and social growth.	3-	K-3					

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER _____

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows that all things change with time.

B. The student values his/her own physical, mental and social growth.

State Goal 1,4

District Goal

Program Goal 2,4

Related Area(s)

Suggested Activities: Grade(s) 1-3	Suggested Monitoring Procedures	Possible Resources
Title: Growing Up Group Size: entire class Materials: none needed Procedure(s): . Discuss with students how they are different from the way they were in kindergarten. List the differences on the chalkboard. Do the same for similarities. . Get students to think about the increase in the number of friends, social courtesies they have learned and how they have learned to use certain skills such as math, language, reading, as well as the more obvious physical changes. . Help the students write an experience chart about growing up.	Observe students' interaction with others. Have students write story or poem called "Growing Up". Have students draw pictures showing changes in themselves.	District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows that all things change with time.

B. The student values his/her own physical, mental and social growth.

State Goal 1,4

District Goal

Program Goal 2,4

Related Area(s)

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Growing Up Group Size: entire class Materials: none needed Procedure(s): . Begin a discussion with the students by asking how many of them have younger brothers and sisters not in school. Have students describe their younger siblings. Write characteristics on the chalkboard in random order then classify them by three categories: physical, social and mental. . Have the students describe characteristics of their peer group. Use the same three categories. Then have the students contrast the two groups. . Lead them in a discussion of what growing up means in terms of how they value their growing up status.	Observe students' interaction with others. Ask students to compare their values with how they behave toward each other. Have students write a story or poem called "Growing Up".	District Resources

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Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows change occurs only as a result of interaction between two or more things. B. The student is able to identify changes in objects as the result of the application of a push or pull (force), e.g., shape, position, direction of movement.

State Goal 1

District Goal

Program Goal 2,4

Related Area(s) Reading, Math

Suggested Activities: Grade(s) 1

Title: How Can You Change These Things With Your Hands?

Group Size: entire class, then small groups

Materials: 60 12-inch pieces of vari-colored cotton/nylon yard, 20 red crayons, 20 sheets white construction paper, 200 paper clips

Procedure(s):

- Give yarn to students. Have them braid the yarn.
- Give students paper clips or pipe cleaners. Have them manipulate the clips or pipe cleaners into different shapes.
- Give each student a red crayon and a small piece of paper. Have student color the whole paper red.

Discussion:

- How did you change the yarn?
- Are there any other things you can do to change the yarn?
- Can you change the clips into a chain?
- How did you change the clips?
- How is the paper changed?
- What is on the paper?
- What happened to the crayon?
- Where is the crayon now?

Title: How Has It Changed? What Made It Go?

Group Size: entire class or small groups

Materials: cardboard tracks for math, reading games of progression, small plastic cars, Hot Wheels and track, dice

Suggested Monitoring Procedures

Teacher stretches a rubber band. The student will state how the rubber band changed and what caused it to change.

Probe students' responses to discussion.

Given a playground ball, the student can identify possible changes in position and direction and predict how these could occur. Verify by experimentation.

Possible Resources

TR: Modular Activities Program in Science, Houghton Mifflin Publishing Company

Fs: Processes of Science, Interaction Prod. Inc.

District Resources

Suggested Activities: Grade(s) 1	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Have students run electric train on track. . Play math game. Throw dice and move object according to dice number. . Have students run Hot Wheels down the track. Discussion: . What made the train move? . Where did it go? . Will it go if we pull the cord (plug) from the wall? . During the dice game, what makes your object move? . What makes the car go?		District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows change occurs only as a result of interaction between two or more things. B. The student knows changes vary in their nature, e.g., physical, chemical state, direction and position. C. The student is able to identify changes in objects as the result of the application of a push or pull (force), e.g., shape, position, direction of movement.

State Goal 1,4
District Goal
Program Goal 2,4

Related Area(s)

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: What Made It Change? Physical Form Change Group Size: whole class (introductory demonstration) Materials: 3 eggs, bowl, hand egg beater Procedure(s): . Break two eggs in a bowl (put shells aside). . Beat two eggs. . Third egg should be hard boiled before lesson starts. . Cut hard boiled egg into halves. Pass among class. Discussion: . What happened to the eggshells? . Are the eggs still eggs after they are broken? . What changed the eggs? . How is the change different from bending paper clips? . Can we change the broken eggs back to whole eggs again? . Compare scrambled eggs with hard boiled eggs.	Have students tell what happened to beaten eggs. Ask: How are the eggs different? How are the eggs the same as they were before?	TB: Humpty Dumpty--from Mother Goose Rhyme-Riddle TB: Scrambled Eggs Supper, Dr. Suess F: Matter Matter Everywhere, Supplement Cat. ESD 109 FS1982 F: Things Change: Solids Liquids, Gases, Britannica Fs: How Things Change, Film Strip of Month Club District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows change occurs only as a result of interaction between two or more things. B. The student is able to identify changes in objects as the result of the application of a push or pull (force), e.g., shape, position, direction of movement.

State Goal	1,4
District Goal	
Program Goal	2,4

Related Area(s)

Suggested Activities: Grade(s) 2-3

Title: What Happened to It?
Group Size: small (2-3)
Materials: 16 pairs of baggies--label one set by number (1-6) and the second by letter (A-F). Numbered baggies hold the whole or unchanged object. Letter baggies hold the changed object (crushed, shaved, cut, mixed). Be sure the letters and numbers do not correspond logically (instead of A-1 make it A-6); three pieces of chalk (1 whole, 2 crushed to chalk dust); potato chips (1st bag whole 2nd bag crushed); whole squares of construction paper; other baggies cut to confetti (scissors, paper punch for making confetti); pencil (sharpener-hand); pencil shaver; apples-whole (cut) juice; hand lenses for each group.

Procedure(s):

- Let students observe, discuss and then match the before and after bags.
- Ask the students: "What is in these bags? (chalk dust). Where did it come from? What changed it? (got smashed, stamped)."

Discussion:

- If I give you some ice, vermiculite, and sugar cubes, can you change them?

Suggested Monitoring Procedures

Have student identify change in objects by matching each substance with it's changed counterpart.

Ask:
- Can the objects be changed back to this original form? How?
- Can the objects be changed to something else?

Ask students to list and discuss changes in the objects.

Possible Resources

TR: Modular Activities Program In Science (Red edition), Houghton-Mifflin Publishing Company

District Resources

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Collisions Group Size: small (2-3) Materials: iron spheres (different sizes), carbon paper, ditto paper, cardboard or wooden V-shaped ramps Procedure(s): . Place two ramps in opposing positions. . Place the ditto paper on the inked side of the carbon paper. Place both pieces of paper between the ramps (be sure to move the ramps to the edge of the paper). . Simultaneously release one sphere from each ramp. The rolling spheres will trace their respective paths on the paper. . Change ramp angle, size of spheres, mix spheres. Discussion: . Describe collisions. . Where does the force come from? . Does the size of the spheres make any difference in the collisions? . Does the angle of the ramp make any difference? . What if you change both the ramp and the spheres?		District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows change occurs only as a result of interaction between two or more things. B. The student knows changes vary in their nature, e.g., physical, chemical state, direction and position. C. The student knows certain factors produce change, e.g., the application of a force, addition or subtraction of a substance from a compound or mixture, heat and light. D. The student is able to identify changes in a substance as the result of the application of heat, e.g., ice to water and water to vapor.

State Goal	1,4
District Goal	
Program Goal	2,4

Related Area(s)

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: What Made It Change? Heat Change--Change of State Group Size: whole class in introductory demonstrations Materials: 20 paper cups, 20 ice cubes, refrigerator, timer Procedure(s): . Put one cup with one ice cube on each desk. . Set timer for fifteen minutes. . Have students predict what will happen to the ice cubes. Verify the prediction by the experiment. . Question students as to why the change occurred--what caused the change? Ask the students the following questions: What is an ice cube? What is the difference in the state of water when frozen and in its natural state? What is needed to have change occur?	Probe students' responses to questions. Ask: How are the changes in the ice cubes different from changes in the eggs? Can the water be changed back to ice? How? Can the hard boiled egg be changed back to the way it was? Why not?	F: Matter, Matter Everywhere--Solid, Liquid, Gas, Coronet Films F: Heat for Beginners, Coronet Films TR: Practical Guide to Kindergarten Activities, "Funny Shapes," Milliken Publishir Co., pgs. 106-107 TR: Practical Guide to First Grade Activities, "Evaporation is the Way the Water Goes," Milliken Publishing Co., p. 123 TR: Ice Cubes, Elementary Scien Study, McGraw Hill Book Co. TR: The Great Perpetual Learni Machine, Jim Blake and Barbara Ernst, Little, Brow and Co., p. 111
Title: Group Size: entire class Materials: film, Matter Matter Everywhere--Solid, Liquid, Gas Procedure(s): . Have students see the film and then lead them in a discussion of the interaction between two or more things to cause change. . Have students describe the difference and similarities in several states of matter as shown in the film. Use the chalkboard and list the differences and similarities as they describe them. Suggestion: Stop the film in the middle to discuss different states of matter.		

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows change occurs only as a result of interaction between two or more things. B. The student knows certain factors produce change, e.g., an application of a force, addition or subtraction of a substance from a compound or mixture, heat and light. C The student is able to identify changes in a substance as a result of the application of heat, e.g., ice to water and water to vapor.

State Goal 1,4

District Goal

Program Goal 2,4

Related Area(s) Reading, Writing, Food, Cooking

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: What Made It Change? Hard Eggs! Group Size: whole class (introductory demonstration) Materials: bowl, one egg for each student, hot plate, water, saucepan, paper towels, salt, pepper, mustard, timer Procedure(s): . Place 6 eggs in saucepan and cover with water. . Bring to a boil. Have students observe eggs boiling. . Show film while waiting for eggs. . Turn off. Set timer to 10 minutes. When timer goes off, cool eggs under cold running water in sink. . Crack, peel eggs and then ask students why the eggs are hard now. . Eat hard-boiled eggs with condiments (salt, pepper, mustard). Discussion: . What changed the eggs? . Can they be changed back? . What is the difference between the change in ice when heated and the eggs when heated? . Compare heated ice, wax, and egg with heated jello, cake mix, ice cream, hamburger.	Ask students to relate the change in the eggs to other changes they have observed in class. Outside of class.	TB: Science Experiments You Can Eat, Vicki Cobb, J. B. Lippincott. TB: Green Eggs and Ham, Dr. Suess F: Matter, Matter Everywhere, ESD #109 Catalog Supplemen District Resources

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Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows change occurs only as a result of interaction between two or more things. B. The student knows changes vary in their nature, e.g., physical, chemical state and position. C. The student knows certain factors produce change., e.g., the application of a force, addition or subtraction of a substance from a compound or mixture, heat and light. D. The student is able to identify changes in a substance as the result of the application of heat, e.g., ice to water and water to vapor.

State Goal 1,4

District Goal

Program Goal 2,4

Related Area(s) Combine with an art period to allow sufficient time for the activity.

Suggested Activities: Grade(s) 2-3

Title: Making A Candle

Group Size: small groups (six)

Materials: small metal (602) juice cans (used empty) & cardboard; 1½ lb. slab of candle wax; white shoe strings or commercial wicks; six pencils; (red, yellow, orange, blue, green) crayon stubs with paper removed or purchased candle dye; hot plate; wooden handle stirring spoon; tray of ice cubes; old sugar sackcloth (get at bakery); wooden mallet; pencils; paper; foil; hot plate; nails

Procedure(s):

- Tie wick to nail and place in can so that the wick hangs down in the can. Break up the wax. Put it in the pan with crayons. Turn on hot plate to low and put pan on burner. Stir until the wax melts. Take pan off burner slowly and put two cracked ice cubes in each can (cans already have wick attached to nail over top).
  *Caution: Teacher pours the hot wax into the can. Then--Watch!
- After copying and discussing candle-making recipe, work through the steps.

Discussion:

- What is going to happen to the wax in pan? (melt)
- Why did the wax change color? (crayons)
- What is going to happen to the ice? (melt)
- What makes it melt? (heat)

*Do not allow the children to pour the hot wax.

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Suggested Monitoring Procedures

Probe the students' responses during the discussion.

Ask the students to relate the changes in the wax to the changes they have observed during other activities in class. Outside of class.

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Possible Resources

TB: Riddles from Mother Goose: "Little Nancy Eticoat"

TB: Frosty the Snowman

TR: The Burning of a Candle, Science Teachers Associati of Ontario, Donco Quality Printers

District Resources

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Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
. Where can we cool candles fast? Outside? In the refrigerator? What things made wax change to liquid? Ice to water? Hot wax to cooled candle? . Follow up: Burn a candle (away from students). Ask the children to make as many observations as possible. . Poem - "What Happened?" Once a seed, Now a plant. Once an egg, Now an ant. Objects change. Once a calf, Now a cow. Once a baby, Full grown now. Objects change. Once a board, Now a chair. Once here, Now there. Objects change.	Count the number of different observations.	District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows change occurs only as a result of interaction between two or more things. B. The student is able to identify changes in substances as the result of exposure to air, e.g., rusting of iron, drying of bread, apple turning brown.

State Goal 1,4

District Goal

Program Goal 2,4

Related Area(s)

Suggested Activities: Grade(s) 1-2

Title: That Apple is Still Good
Group Size: entire class
Materials: apples, knife, baggies, paper towels or napkins, plastic wrap and timer

Procedure(s):

- Distribute a part of an apple to each student and ask them to take one bite of the apple. Ask students to describe the appearance of the apple where they have taken a bite. Have them set the apple on a towel for fifteen minutes.
- Cut four apple slices and tightly wrap them in plastic wrap. While students wait fifteen minutes, read them the story of Dr. Suess, Ten Apples Grow Up.
- After the story ask students to describe the appearance of their apple. Have the students bite into the area previously eaten. Ask them if the apple tastes differently. Was there any change in the taste?
- Contrast the appearance of the cut apples that were plastic wrapped. Have the students suggest what caused the difference, e.g., exposure to light or air.
- How can we find out if it was the light or air that caused the change in appearance? (Wrapped apples were exposed to light but not air.) Place sliced apple in a box with lid to keep out light. Which apple changed?
- Have students predict what change occurs in a peeled banana and potato exposed to air and light.

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Suggested Monitoring Procedures

Have students describe foods such as apples, bananas and potatoes which discolor when not wrapped properly.

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Possible Resources

TB: Ten Apples Grow Up, Dr. Suess

District Resources

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Suggested Activities: Grade(s) 1-3	Suggested Monitoring Procedures	Possible Resources

Title: Food Change
Group Size: small group
Materials: 3 apples, 3 potatoes, 2 bananas, knives, plastic wrap, bread (3 slices wrapped), timer

Procedure(s):

- Have students (under close supervision) quarter apples and potatoes, slice bananas, and cut bread slices in half.
- Have students use plastic wrap on one-half of apple, potato, banana and bread pieces.
- Turn timer to 30 minutes.
- Make chart for notes.
- Show film on changes while waiting for fruit to change.

Discussion:

- Ask students to predict what will happen to the substance, e.g., dry out, rot, rust, spoil, as a result of exposure to air and light.
- Have students (after timer sounds) describe and record what has happened to exposed substances and those protected from air.

Chart for notes for each substance

	Exposed (uncovered)	Covered (unexposed)
Potato		
Apple		
Banana		
Bread		

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District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows change occurs only as a result of interaction between two or more things. B. The student knows changes vary in their nature, e.g., physical, chemical state and position. C. The student knows certain factors produce change, e.g., an application of a force, addition or subtraction of a substance from a compound or mixture, heat and light. D. The student is able to identify changes in substances as the result of exposure to air, e.g., rusting of iron, drying of bread, apple turning brown.

State Goal	1,4
District Goal	
Program Goal	2,4

Related Area(s)

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Checking Changes Group Size: individual or small groups Materials: collect objects--apple, egg, cookie, tomato, rock, dog biscuit, magnet, nail, other metals, spring, weights (to hang on spring), table knife Procedure(s): . Ask students: "What can you do to get each object to change?" Tell them to try it (wet them, heat them, dry them). Ask: "What is your evidence?" (An apple can be cut into two pieces.) Discussion: . Did these objects change all by themselves? (Note: Remember that some objects interact with the air.) . Introduce the word "interaction." . Variations: Have students devise ways to protect the objects from change. Have them devise ways to measure the changes (e.g., rate of mold growth on bread).	Ask students to describe the change produced by the interaction of two objects that are touching each other. Ask students to describe the change produced by the interaction of two objects that do not touch, e.g., magnet and nail.	F: Matter, Matter Everywhere: How Materials Change, Coronet, 1970 F: Chemical Changes All About Us, Coronet
Title: Demonstrating Change Group Size: individuals or small groups Materials: student planned Procedure(s): . Have students select samples of different kinds of changes (e.g., fresh bread--dry bread; steel wool and rusted steel wool; candle and melted candle; etc.). Demonstrate to class on how these changes occurred. . Ask students to identify the interacting objects.	Ask students to bring objects from home which have been changed as the result of interaction, e.g., broken toy, rusted iron, etc.	F: Simple Changes in Matter, F0727 K: Creative Moments, Creative Studies Inc., "Curds and Whey"

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Rust and Steel Wool Group Size: learning center or entire classroom demonstration Materials: 3 steel wool balls, vinegar, 2 bowls Procedure(s): . Pour vinegar in two bowls. Place a steel wool ball in each bowl. Make sure the vinegar covers the steel wool. . Place third steel wool ball next to the two bowls. Make sure that it stays dry. . Let stand overnight. . The next day pour the vinegar out of the first bowl. Leave the second bowl as it is. Within 45 minutes steel wool in the first bowl will begin to rust. Discussion: . Ask students what they have observed. What is happening? Then ask them why it hasn't happened to the other two balls. . Ask the students that if what they observed is change, what it is interacting with.	Ask students to predict what will happen if the steel wool is taken out of the second bowl. Ask how they could get the 3rd steel wool ball to "rust." Probe students' responses to discussion questions. Help clarify misconceptions by leading the students through the experiment a second time.	District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student is able to identify daily changes in the weather, e.g., temperature, relative humidity, cloudiness.

State Goal	1,4
District Goal	
Program Goal	2,4

Related Area(s)

Suggested Activities: Grade(s) K-2	Suggested Monitoring Procedures	Possible Resources
Title: Weather Chart Group Size: entire class Materials: weather symbols, calendar Procedure(s): . Students identify and draw basic weather symbols. . Students keep a weather chart by placing weather symbols and temperature on a calendar each day for a month. Discussion: . Discuss changes from day-to-day. Week-to-week.		District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources
		District Resources

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SMALL SCHOOLS PROJECT - Working Copy

SUBJECT: Science

SPECIFIC AREA: Cycles

	Page	Suggested Grade Placement	District Placement K	1	2	3	4
The student knows:							
. the term "cycle" means a series of events or operations that recur regularly and usually lead back to the starting point.	29-	K-3					
. there are several common cycles which influence his/her life, e.g., life cycles, earth-sun cycle, earth-moon cycle, water cycle, weather cycles.	29-	K-3					
. some cycles may influence the nature of other cycles.	47-	K-3					
. the progression of the daily earth-sun cycle.	43-	1-3					
. the progression of the yearly earth-sun cycle.	47-	1-3					
. the progression of the phases of the moon.	51-	3					
. the progression of the water cycle.	57	2-3					
. there are many job opportunities in science.		K-3					
The student is able to:							
. identify the major events in the life cycle of a plant (formation of seeds, seed leaves and roots, stem and leaves, flowers).	27-	K-3					
. identify the major stages (egg, larvae, pupae, adult) in the life cycle of an animal such as the Darkling Beetle (meal worm).	37-	K-3					
. identify position changes in a shadow (shadow stick) as the hourly and daily position of the sun changes.	41-	K-3					
. identify local noon.	43-	2-3					
. identify seasonal changes (winter, spring, summer, autumn) as the sun changes its relative position on the horizon.	47-	K-1					
. identify hourly and daily position changes of the moon.	51-	3					
. identify the major events in the progression of the water cycle (evaporation, transpiration, condensation).	57	2-3					
. identify the progression of weather changes as the seasons change.	59-	K-3					
The student values:							
. weather changes for recreation and variation.	59-	2-3					

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER _____

C4

C5

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student is able to identify the major events in the life cycle of a plant (formation of seeds, seed leaves and roots, stem and leaves, flowers).

State Goal	1,4
District Goal	
Program Goal	3,4,5

Related Area(s)

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Beginnings Group Size: small or individual Materials: bean seeds, cotton, paper cup Procedure(s): . Put cotton in the paper cup and moisten. Put several bean seeds in and leave overnight. . Next morning take one bean seed out and remove seed coat. . Divide the seed in half and look at beginning growth (observe using a hand lens). . Continue germination with the other seed until well sprouted. Discussion: . What happened to the seed after it was put in water? . What will happen to the seed if we plant it? . Why would you want to germinate seeds? . Draw a picture of seed germination.	Have students draw a picture of seed germination. Ask each student to plant some seeds and record observations as the plants grow. Make a simple bar graph (histogram) of the plant's weekly growth.	TB: How A Seed Grows, Helen Jordan, Thomas Y. Crowell Co. TB: Seeing What Plants Do, Joan Rahn, Atheneum TB: Plants are Like That, Harris A. Stone and Irving Leskowitz, Prentice TB: I Found A Leaf, Sharon Lerner TB: Wide Eyed Detectives, Laidlaw Fs: How A Plant Grows, #400095 McGraw Fs: The Story of Seeds, Eyegate Fs: Work of Flowers, Brittanica Fs: How Seeds Sprout and Grow Into Plants, Brittanica TR: The Great Perpetual Learning Machine, Jim Blake and Barbara Ernst, Little, Brown and Company, p. 58 TR: Growing Seeds, Elementary Science Study, McGraw Hill Book Company TR: Life of Beans and Peas, Elementary Science Study, McGraw Hill Book Company

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the term "cycle" means a series of events or operations that recur regularly and usually lead back to the starting point. B. The student knows there are several common cycles which influence his/her life, e.g., life cycles, earth-sun cycle, earth-moon cycle, water cycle, weather cycles. C. The student is able to identify the major events in the life cycle of a plant (formation of seeds, seed leaves and roots, stem and leaves, flowers).

State Goal	1,4
District Goal	
Program Goal	3,4,5

Related Area(s)

Suggested Activities: Grade(s) 2-3

Title: How Does Light Affect Seed Germination?

Group Size: small

Materials: bean seeds, lawn seeds, flower pots, soil, sponges, bowls, water

Procedure(s):

- Plant bean seeds in flower pots and label one pot "dark" and the other "light". Place the appropriately labeled one in the dark and the other in the light.
- Keep both pots well watered and ventilated, temperature normal.
- Variation: Wet 2 sponges and place in 2 bowls. Add water to ½" depth. Sprinkle each with lawn seeds. Place one in dark and one in light (not direct sunlight). Keep temperature and ventilation the same for both.

Discussion:

- Why are some flowers planted on the south side of homes? On the north side?
- Do seeds need food to germinate?
- Where do seeds get the food necessary to support their growth?
- Do you think all seeds need water to germinate?
- How could you prevent germination of weed seeds in your garden?

Suggested Monitoring Procedures

Have students hypothesize why seeds germinate under ground where no sunlight reaches them.

Possible Resources

F: Seeds Grow Into Plants, Coronet

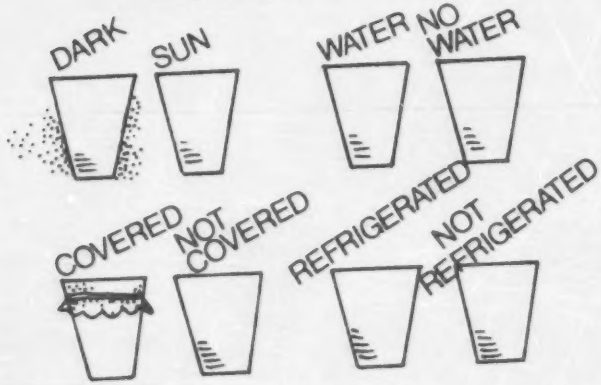
F: Let's Watch Plants Grow, Coronet

TB: Growing, Marie Neurath, Sterling, 1963

TB: Watch Out For My Plant, Barr, 1972

TR: Practical Guide to Second Grade Activities, "Plants and Light," Milliken Publishing Co., pp. 105-106

TR: Practical Guide to First Grade Activities, "Plants Respond to Light," Milliken Publishing Company, p. 107

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Germination Necessities Group Size: small Materials: Prepare 8 tumbler gardens. Line the inside of a water glass with paper towel. Stuff the inside with cotton or crumpled paper towels. Insert seeds between the paper cylinder and the glass. Water the cotton to keep moist.  Procedure(s): . Do four different germination experiments with eight tumblers. Do each in sets of two (see diagram). . Place one tumbler in the dark and one in the light. Water one regularly and do not water the other. . Cover one tumbler tightly with plastic wrap and keep the other tumbler continually exposed to the air. . Place one tumbler in the refrigerator. Discussion: . What have we discovered are the necessities of plant growth? . Why is it hard for people to have gardens where the weather is cold? In the desert?	During discussion period, have students state directly or indirectly that seeds need water, air, warmth, to germinate	F: Learning About Seeds, Britannica District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the term "cycle" means a series of events or operations that recur regularly and usually lead back to the starting point. B. The student knows there are several common cycles which influence his/her life, e.g., life cycles, earth-sun cycle, earth-moon cycle, water cycle, weather cycles. C. The student is able to identify the major events in the life cycle of a plant (formation of seeds, seed leaves and roots, stem and leaves, flowers).

State Goal	1,4
District Goal	
Program Goal	3,4,5

Related Area(s)

Suggested Activities: Grade(s) 2-3

Title: Do Seeds Need Water to Germinate?
Group Size: small
Materials: flower pots, soil, water glass, bean seeds, radish seeds, paper towels

Procedure(s):

- Plant bean seeds in wet and dry soil. Label one pot "dry" and the other "wet".
- Keep temperature, light and ventilation normal and equal for both pots.
- Keep wet pot moist but do not water dry pot.
- Variation: Place two folded paper towels in the bottom of each of two glasses. Sprinkle some radish seeds on each pad and cover with another paper towel. Label one glass "dry" and the other "wet". Keep the towel in the wet glass moist and the towel in the other glass dry.
- Maintain temperature, light and ventilation as in procedure "A".

Discussion:

- Do all seeds require the same amount of water for germination?
- How do farmers control the amount of water they use after planting their seeds?
- Is ocean water (or fresh water with table salt added) good for germination? How could we find out?

Suggested Monitoring Procedures

Have students design and carry out an experiment to verify the predictions made during discussion.

Possible Resources

TB: The Amazing Seeds, Ross Hutchins, Dodd, 1965
TB: Green Is For Growing, Winifred Lubell, Rand, 1964

F: What Do Seeds Do? BFA
F: From Seeds to Plants. Gateway

Fs: Parts of Plants, Britannica

District Resources

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: How Does Air Affect Germination? Group Size: small Materials: lima bean seeds, cotton, radish seeds, water, 4 jars, soil Procedure(s): . Plant lima bean seeds in jars. Fill one jar to the top with water so the air is forced out of the soil. Keep temperature and light the same for both jars. Keep second jar moist. . Variation: Fill two jars to the top with water. On one jar place a cotton pad on top and some radish seeds on the cotton. (This will keep the seeds moist.) . Drop seeds into the water of the second jar, thus eliminating the air. Discussion: . What other ways might air be eliminated from the jars? . Is too much air ever a problem to a farmer? . How could the farmer protect his crops from windstorms?		TB: Plants With Seeds, Dorothy Wood, Follett, 1962 TB: My Garden Grows, Aldren Watson, Viking, 1962 TB: The True Book of Plant Experiments, Illa Podendorf, Childrens Press, 1960 TR: Practical Guide to First Grade Activities, "Do Plants Need Air?" Milliken Publishing Company, p. 112
Title: Cycle Group Size: individual Materials: pots, bean seeds Procedure(s): . Plant seeds in container. As seeds begin to grow, students should keep a record of plant growth through writing, drawing, and bar graph (histogram) showing weekly growth. . Each stage should be discussed from germination to death of the plant. . Be sure to provide plenty of sunlight or light from a "grow-lite." Discussion: . How did the plant begin? . What happens after germination? . Why does the bean plant grow a flower? . What happens after the flowering is finished? . What is inside the bean pod? . How will new plants grow from this plant? . What will happen to this plant?	Given a set of teacher-supplied pictures, have student arrange the stages of plant growth in sequential order.	Fs: New Plants From Seeds, Jam Handy Fs: How Seeds Sprout and Grow Into Plants, Britannica Fs: What's Under the Farmer's Garden?

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the term "cycle" means a series of events or operations that recur regularly and usually lead back to the starting point. B. The student knows there are several common cycles which influence his/her life, e.g., life cycles, earth-sun cycle, earth-moon cycle, water cycle, weather cycles. C. The student is able to identify the major events in the life cycle of a plant (formation of seeds, seed leaves and roots, stem and leaves, flowers).

State Goal	1,4
District Goal	
Program Goal	3,4,5

Related Area(s)

Suggested Activities: Grade(s) 2-3

Title: What Happens to Vegetation After It Dies?
Group Size: small
Materials: dead plants, lettuce leaves, soil, plastic bags

Procedure(s):
- Put some soil in a plastic bag. Put a number of dead plants on top of the soil. Put some water in the bag. Close the bag.

Discussion:
- What happens to plants when they die?
- How do dead plants help the soil?
- What is another word we can use when we talk about plants rotting (decomposing)?

Title: Natural Recycling
Group Size: small
Materials: scales, 1 ball of string, leafy vegetable, potatoes, carrots or such plant materials which you can get from the grocer's garbage can; fresh grass, nylon stockings (large mesh), plastic or nylon bags, pencils, data charts, plastic bags without holes, wooden stakes

Suggested Monitoring Procedures

Start an in-class compost supply in a plastic bag. Use the composted materials to enrich plants growing in the classroom.

In response to discussion, have students state that plants must decompose in order to enrich the soil for further plant growth.

Possible Resources

F: Food Cycle and Food Chains, Coronet

District Resources

Suggested Activities: Grade(s) 2-3

Suggested Monitoring Procedures

Possible Resources

Procedure(s):

. Distribute a data chart and 3 different bags to each student.

Container	Weight			Appearance of bag and contents	
	Before	After	Difference	Before	After
Nylon stocking with dead vegetation					
Mesh bag with dead vegetation					
Plastic bag with dead vegetation					

. Discuss instructions on Data Chart.
. Put some of each type of vegetable material available into each bag.
. Observe each vegetable type and record its appearance on the data chart.
. Close and tie each bag firmly with a string, leaving extra string to tie the bag to a stake.
. Dip all the bags in water, remove them and allow to drip for one minute. Weigh the bags and record the weights on the data chart.
. Tie all three bags to a stake. Use the stake to firmly position the bags under water at some convenient place in an aquatic habitat.

District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the term "cycle" means a series of events or operations that recur regularly and usually lead back to the starting point. B. The student knows there are several common cycles which influence his/her life, e.g., life cycles, earth-sun cycle, earth-moon cycle, water cycle, weather cycles, C. The student is able to identify the major events in the life cycle of a plant (formation of seeds, seed leaves and roots, stem and leaves, flowers).

State Goal	1,4
District Goal	
Program Goal	3,4,5

Related Area(s)

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
. Allow 1-8 weeks before retrieving the bags. Drain the bags for one minute and record the weights on the data chart. . Open the bags, observe the contents and record the appearance of the contents on the data chart. . Students compare results. Discussion: . Can you explain the changes in the 3 bags? What does the kind of bag have to do with it? . What would happen if dead vegetation did not decompose? . Variation: Examine dead leaves from the bottom of a big pile of leaves. Compare them with leaves from the top of the pile. Then compare them both with green leaves on a tree. Describe the differences.		
Title: How Do We Test Seeds For Germination? Group Size: small Materials: 1 square foot of cotton flannel, 100 radish seeds, pan of water, thermometer Procedure(s): . Dampen flannel with water and place 100 radish seeds over flannel. . Roll flannel into rather loose roll and place one end of roll in a pan of water. . Place thermometer and rolled flannel in a pan of water in an open window for 10 days, adding water in pan as needed. . Record temperature daily. . After 10 days, unroll flannel and count number of seeds sprouted.		District Resources

Suggested Activities. Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Discussion: . What are some conditions that might increase the germination ratio? . What might be some factors other than water that might produce a low germination ratio? . Would most seeds have the same germination ratio? How could we find out?		District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student is able to identify the major stages (egg, larvae, pupae, adult) in the life cycle of an animal such as the Darkling Beetle (mealworm).

State Goal 1,2,4

District Goal

Program Goal 1,2,4

Related Area(s)

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Life Cycle of Darkling Beetle I Group Size: individual or entire class Materials: electrical tape-clear plastic; containers (from P.U.D. or telephone company) or baby food jars (punch one hole in top); five large mealworm larvae, two small mealworm larvae, one label (above materials needed for each student) hand lenses, bran flakes or malt-o-meal, masking tape, red fingernail polish, knife, slice of apple, potato, carrot Procedure(s): . Several weeks in advance, fill each container 1/8 full with bran flakes or malt-o-meal. Place several mealworms in each dish. Place a loose fitting cover over the top. . Give each student a mealworm culture labeled with student's name and have him/her examine larvae with magnifiers. . Allow each student to let a mealworm crawl in his/her hands or on his/her desk. . Have students count their mealworms, record the number on the tape on the cover. Return mealworms to their containers and set cultures aside. . Gather students to discuss observations. You may wish to have students draw their mealworms to encourage closer observation.	Have students arrange in correct order a set of cards or pictures on life cycles.	F: The Big Green Caterpillar, Stanton F: Cecropia Moth F: Crack in the Pavement, Film-Fair Col. F: Monarch Butterfly Story, Britannica F: Life Story of the Ladybird Beetle, Britannica F: Kittens-Birth and Growth, Bailey Film Assoc. F: Wild Animal Families, Bailey Film Assoc. F: Fish Embryo from Fertilization to Hatching, Britannica F: Salmon-Life Cycle of the Sock Eye, Bailey Film Assoc. F: Fresh Water Plankton and the Chain of Life, Classroom (Fleet) F: Poultry on the Farm, Britannica OT: Animals, (ESD) p0210 TR: Behavior of Mealworms, Elementary Science Study, McGraw-Hill Book Company

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
. Cultures may be kept inside desks or taped to desk tops for informal observation. . Eventually students will see shriveled skins. They may conclude that some mealworms have died. Ask students to count mealworms. . Students may paint a stripe on the back of each mealworm, using red nail polish. When skins are found again, students will observe red stripe on the shriveled objects not on pale mealworm. Discussion: . Vocabulary - egg, larva, pupa, adult, molting, metamorphosis. . Observe and describe each stage of the life cycle. . Draw pictures of each stage of the life cycle. . Name other organisms that go through metamorphosis. . Draw each stage on a separate card and have students put them in order to make the life cycle. . Compare the life cycle of different animals.		TB: Butterfly Time, Alice Goudy, Scribners, 1964 TB: When Insects are Babies, Gladys Conklin, Holiday House, 1969 District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student is able to identify the major stages (egg, larvae, pupae, adult) in the life cycle of an animal such as the Darkling Beetle (mealworm).

State Goal	1,2,4
District Goal	
Program Goal	1,2,4

Related Area(s)

Suggested Activities: Grade(s) 3

Title: Life Cycle of Darkling Beetle II
Group Size: entire class
Materials: mealworms, hand lenses, container and cover, sand, paper towel, malt-o-meal, slice of apple or potato, or carrot (every month)

Procedure(s):

- Place enough bran or oatmeal in a container to cover the bottom to depth of about (two inches) 5 to 6 centimeters.
- Next put some mealworms in the container and then place pieces of paper towel on the surface of bran. Occasionally add a slice of carrot or apple or potato for moisture.
- The students should count the number of mealworms and keep track of the number from time to time.

Discussion:

- Observe and describe the natural stages of the life cycle--egg, larval, pupa, adult.
- Other suggestions: Use flies, crickets, caterpillars, or tadpoles.

Title: All Living Things are Born and Grow
Group Size: entire class
Materials: copies of the following poems

Suggested Monitoring Procedures

Have students state, write or draw the natural stages of the life cycle of the darkling beetle (egg, larval, pupa, adult).

Possible Resources

TR: Practical Guide to Third Grade Activities, "Life Cycle of Mealworms," pp. 104-105, "Behavior of Mealworms," pp. 105-106, Milliken Publishing Co.

TR: Behavior of Mealworms, Elementary Science Study, McGraw-Hill Book Company

District Resources

Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources
A cat will have a baby cat, never, never a baby bat! A bear will have a baby bear, never, never a baby hare. A bee will have a baby bee, never, never a baby flea. A whale will have a baby whale, never, never, a baby snail. An eagle will have a baby eagle, never, never a baby beagle. A swan will have a baby swan, never, never a baby awn. A monkey will have a baby monkey, never, never a baby donkey. A moose will have a baby moose, never, never a baby goose.		
Growing Up How do I know I'm growing I can't wear last year's coat It's too tight. Last year's shoes are too small for me. My legs are too long to ride my old tricycle. Now I can reach the shelf for the peanut butter. I don't have to stand on a chair anymore. I can carry a whole bag of groceries. I can even pick up my baby brother. I can kick the ball farther. I can run farther. I can jump higher. I can play longer. With all these clues, I know I'm growing. What clues tell you that you are growing?	Ask students to write their own poems about growing up.	District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the term "cycle" means a series of events or operations that recur regularly and usually lead back to the starting point. B. The student is able to identify position changes in a shadow (shadow stick) as the hourly and daily position of the sun changes.

State Goal 1,4,10

District Goal

Program Goal 1,2,4

Related Area(s)

Suggested Activities: Grade(s) K-1

Title: My Day
Group Size: class
Materials: pictures

Procedure(s):
- Students pantomime activities they do at least once every day. Have them guess what action is being performed and at what time they usually do this.
- Divide demonstration into 2 groups to cover daytime and nighttime activities.

Discussion:
- Why are they grouped this way?

Title: Variation
Group Size: individual
Materials: magazine pictures of activities done during day and night

Procedure(s):
- Students put pictures in groups of morning activities, daytime activities, and evening activities.
- Students make collages from their pictures.

Discussion:
- Ask the students how the pictures make them feel.

Suggested Monitoring Procedures

See discussion.

Discuss the pictures with the students as they put them in different groups.

Possible Resources

TB: What We Do Day By Day, American Dairy Council.

District Resources

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Shadows Group Size: class or small group Materials: flashlight, small objects from around room Procedure(s): . Read and discuss the poem "My Shadow" by Robert Louis Stevenson. . Students put small objects on white paper. . Using a flashlight, make the shadow long and then short. . Make the shadow go away. . Students trace their shadows on the pavement at different times of day. . Make shadows on a screen (use an overhead or slide projector as the light source). Discussion: . What makes the difference? . At what time of day are the shadows longest? Shortest? . Variation: Student goes outside and observes shadow. What makes the shadow?	Have students hypothesize that the shadow is an absence of light.	TR: Practical Guide to Kindergarten Activities, Milliken Publishing Co., "Shadow Games" pp. 126-128 TR: The Great Perpetual Learning Machine, Jim Blake and Barbara Ernst, Little, Brown and Company, pp. 82, 251 TB: Come Out, Shadow, Wherever You Are! Bernice Myers, Scholastic Book Services District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 1-3

Student Learning Objective(s) A. The student knows there are several common cycles which influence his/her life, e.g., life cycles, earth-sun cycle, earth-moon cycle, water cycle, weather cycles. B. The student knows the progression of the daily earth-sun cycle. C. The student is able to identify position changes in a shadow (shadow stick) as the hourly and daily position of the sun changes. D. The student is able to identify local noon.

State Goal 1.4.10
District Goal
Program Goal 1.2.4

Related Area(s)

Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources
Title: Light For the Earth I Group Size: small groups Materials: lamp for sun, a globe for the earth, clay Procedure(s): . Have a student place the globe 8 to 10 feet away from the lamp. Shine the lamp on the globe (in a darkened room). . Is all the globe lighted? Which side is day? Which side is night? . Place a bit of clay on the dark side. Turn the globe slowly from west to east. How much time goes by when the real earth turns around once?	Observation and discussion. Probe student responses to discussion.	F: Shadows on Our Turning Earth, Dist. Baily Assoc. c. 1962 F: The Sky, dist. Bailey Film Assoc. c. 1961 TB: Poem, My Shadow, Robert Louis Stevenson TR: Elementary School Science, Addison-Wesley Publishing Co. TR: Daytime Astronomy, Elementary Science Study, McGraw-Hill Book Company
Title: Light For the Earth II Group Size: small group Materials: globe Procedure(s): . Students stand a globe outdoors in the sunlight. Tilt its north pole slightly toward the north during the winter or slightly to the south during the summer (straight up during spring and autumn). Discussion: . How much of the globe is in the direct sunlight? . Look around you. Is your part of the earth in direct sunlight, too? . Suppose you were out in space and could see the real earth. What part would be in shadow? Would the part in shadow have daytime or nighttime? . Students stick a little clay with a tooth pick straight up in the clay on your state, facing the sun.	Probe student responses for depth of understanding.	TR: A Sourcebook for Elementary Science, Elizabeth B. Hone Harcourt, Brace and World FL: Night & Day, International Comm. Fms.

Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources
Discussion: . Observe where its shadow falls. Look at the shadows of poles around you. Do these shadows point in the same directions as the tooth pick's shadow? . Turn the model earth slowly. Does half still get sunlight? Does half stay in shadow? . Make state go from day to night. . Can you tell where "sunrise" and "sunset" are taking place?		
Title: Shadow Stick Group Size: small group Materials: pole (flag, light) or stick placed on ground, chalk, paper and pencil Procedure(s): . Student marks shadow of pole or stick with something and records the time. Have student mark the place where he/she predicts the shadow will be in 15 minutes. Have student wait and see where the tip of the shadow is and then try again.	Compare student predictions with actual position of shadow after the set time.	TB: Let's Try It Out-Light and Dark, Seymour Simon, McGraw-Hill, 1970 TB: Shadows, Larry Kittlekamp, William Morrow, 1957 TR: A Sourcebook for Elementary Science, Elizabeth B. Hone, Harcourt, Brace & World, pp. 152, 267
Discussion: . Predict where the shadow will be after 30 minutes and after an hour. . Why do you suppose the shadow changes its position? Is it because the pole moves? Could the earth be moving? Could the sun be moving?	Using the globe and lamp model, demonstrate answers to discussion questions concerning earth-sun position changes.	TR: A Sourcebook for Elementary Science, Elizabeth B. Hone, Harcourt, Brace & World, p. 152, 267

SMALL SCHOOLS PROJECT

Suggested Objective Placement 1-3

Student Learning Objective(s) A. The student knows there are several common cycles which influence his/her life, e.g., life cycles, earth-sun cycle, earth-moon cycle, water cycle, weather cycles. B. The student knows the progression of the daily earth-sun cycle. C. The student is able to identify position changes in a shadow (shadow stick) as the hourly and daily position of the sun changes. D. The student is able to identify local noon.

State Goal	1,4,10
District Goal	
Program Goal	1,2,4

Related Area(s)

Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources
Title: Sun Fan Group Size: individual Materials: clay, 2 to 5 straws Procedure(s): . Have student stick a lump of clay on step or outside window sill. Choose a sunny spot. . He/she will stick a drinking straw into the clay and place it so it does not cast a shadow. . Ask: Where must it point in order not to cast a shadow? Does the straw point directly toward the sun? How can you explain what you see? . After one hour, have a student stick a second straw into clay and point it toward the sun so that it does not cast a shadow, being careful not to move the first straw. In this way he/she adds a new straw every hour. Discussion: . Why do you suppose the sun seems to change position? . Does it move? Or could it be the earth that is moving? How can we find out?	Probe student responses for depth of understanding.	District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

SMALL SCHOOLS PROJECT

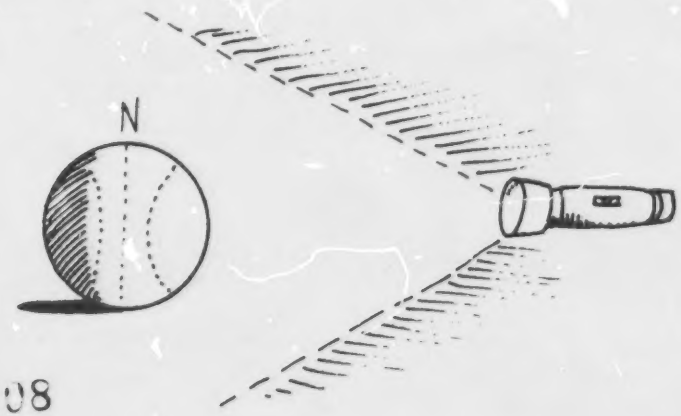
Suggested Objective Placement 1-3

Student Learning Objective(s) A. The student knows the progression of the yearly earth-sun cycle. B. The student knows some cycles may influence the nature of other cycles. C. The student is able to identify seasonal changes (winter, spring, summer, autumn) as the sun changes its relative position on the horizon.

State Goal	1,4
District Goal	
Program Goal	2,4

Related Area(s) _____

Suggested Activities: Grade(s) 1-2	Suggested Monitoring Procedures	Possible Resources
Title: The Seasons Group Size: class Materials: pictures depicting the 4 seasons Procedure(s): . Have students make pictures of the four (possibly only two during the first lesson) seasons and put the pictures in order starting with fall. Discussion: . How are the seasons different? What is it like in fall? Winter? Spring? Summer?	Have students name the seasons of the year.	TR: Exploring Science, Laidlaw TR: Science Adventures, Singer F: Families & Weather F: What's the Weather Like 10 min-col- c1967, McGraw-Hill F: Birds in Winter, 11 min, c 1946, Coronet F: Autumn on Farm, 11 min-col-c F: Spring on Farm, 11 min-col-c F: Summer on Farm, 11 min-col-c F: Winter on Farm, 11 min-col-c Encyclopedia Brittanica F: Causes of the Seasons, Coronet, 196 F: Seasons, A-V Ed. Films F: Autumn is an Adventure, 11 min., p. color, 1957 Coronet F: Spring is an Adventure F: Summer is an Adventure F: Winter is an Adventure F: Animals in Spring, 11 min.w/ F: Summer, 1954 Brittanica
Title: Trees Group Size: whole class Materials: felt cutouts; trees, leaves, snow, clouds, sun Procedure(s): . Have students go up to flannel board and construct a tree for the season named. . Students draw a series of pictures showing a tree at four different times of the year.	Have students complete a series of pictures showing a tree during the four seasons.	

Suggested Activities: Grade(s) 1-2	Suggested Monitoring Procedures	Possible Resources
Title: Try This Group Size: whole class Materials: basketball, flashlight Procedure(s): Using a basketball, mark the north pole and south pole on it. Turn on a flashlight and shine it on the basketball. Hold the ball so that the north pole points straight up and the south pole straight down to the floor. . With the basketball in front of him/her, have student walk around the flashlight. Keep turning the flashlight so the light falls on the ball. . Ask students: "Does the north pole and south pole have light all of the time? Why?" . Now tilt the basketball, keeping the north pole pointed in this way, as the student walks around the flashlight. . Ask: "Does the north and south pole have light all the time? Why?"  	Probe student responses to discussion.	F: Animal Behavior F: Winter, Spring, Summer, Fall, col-11min. c 1973 Internat'l Film Bur. District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 1-3

Student Learning Objective(s) A. The student knows the progression of the yearly earth-sun cycle. B. The student knows some cycles may influence the nature of other cycles. C. The student is able to identify seasonal changes (winter, spring, summer, autumn) as the sun changes its relative position on the horizon.

State Goal	1,4
District Goal	
Program Goal	2,4

Related Area(s) _____

Suggested Activities: Grade(s) 1-2	Suggested Monitoring Procedures	Possible Resources
. Explain to the students that the north pole has summer when the sun shines on the north pole. At this time, the south pole has winter because it is tilted away from the sun and the sun does not shine there. . The north pole has winter when the sunsnine does not fall on the pole. At this time, the south pole has summer because it is getting more direct sunlight Discussion: . Use the basketball and the flashlight. . Show the earth when the south pole has summer. . Show the earth when the north pole has summer. . Where is the earth when the north pole has autumn? Show this. . Where is the earth when the north pole has spring? Show this.		District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows there are several common cycles which influence his/her life, e.g., life cycles, earth-sun cycle, earth-moon cycle, water cycle, weather cycles. B. The student knows the progression of the phases of the moon. C. The student is able to identify hourly and daily position changes of the moon.

State Goal	1,4,10
District Goal	
Program Goal	1,2,4

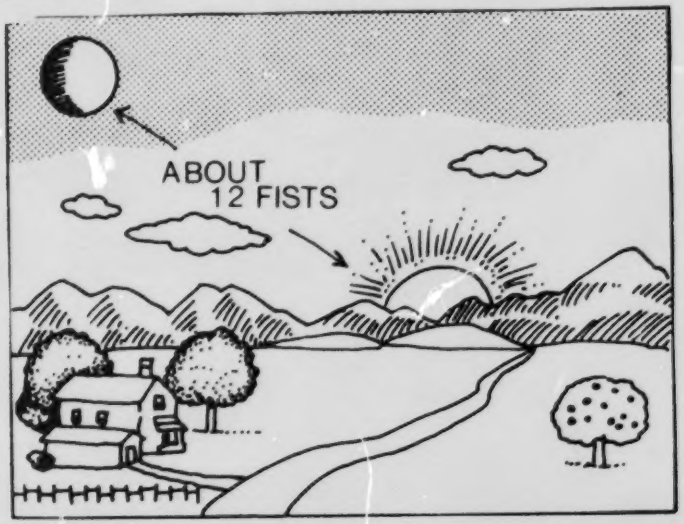
Related Area(s) _____

Suggested Activities: Grade(s) 3

Title: Moon Journal
Group Size: class
Materials: drawing paper

Procedure(s):

- Have students keep a journal recording the moon's position each night at the same time for a month.
- Each day they will draw a picture showing the moon's position and phase. Record on each sheet, the time, where they made their observation, and also measure how many fists from the earth's horizon the moon is.
- If possible, have the student observe from the same place each day. Stress the need for care when placing moon.
- If the moon is not visible, students should note in journal that they were unable to see the moon.



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Suggested Monitoring Procedures

Periodically check students' journal.

Probe student responses for depth of understanding and correctness of observation.

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Possible Resources

TR: Where Was the Moon? Elementary Science Study, McGraw-Hill Book Company

TR: The Great Perpetual Learning Machine, Jim Blake and Barbara Ernst; Little, Brown and Company, pp. 82-85

FL: Night and Day, Intern. Commun. Film

District Resources

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Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources
You may make a ditto of the horizon and the students will only have to draw in the moon and record the number of fists high. . Call to the students' attention that the sun is often visible when the moon is. iscussion: . Does the moon appear to be in the same position at the same time each night? . Have you seen the moon during the day time? . Does the apparent shape of the moon change from day to day?		TR: Science Adventures, Singer TR: Practical Guide to Second Grade Activities, "Which is Larger, the Moon or the Sun?", Milliken Publishing Company, pp. 121-122 TR: Daytime Astronomy, Elementary Science Study, McGraw-Hill Book Company TB: What Makes Day and Night? Franklin Branley, Thomas Y. Crowell Company

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District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows there are several common cycles which influence his/her life, e.g., life cycles, earth-sun cycle, earth-moon cycle, water cycle, weather cycles. B. The student knows the progression of the phases of the moon. C. The student is able to identify hourly and daily position changes of the moon.

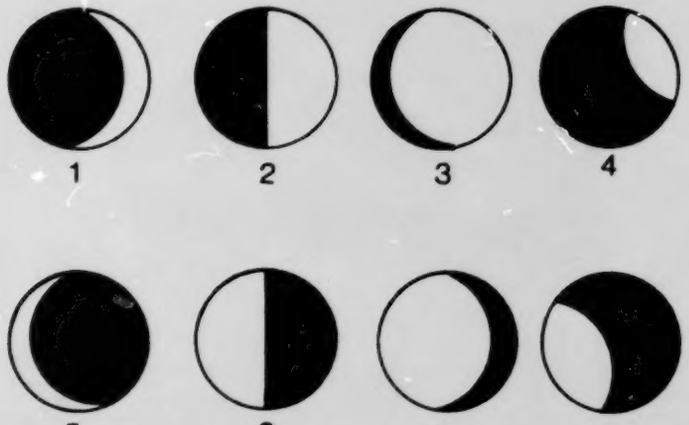
State Goal 1.4.10

District Goal

Program Goal 1.2.4

Related Area(s)

Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources
Title: Sunlight On the Moon I Group Size: 2-3, class Materials: globe, flashlight Procedure(s): . Have a student hide a globe in a dark room. . Take a flashlight and look for the globe. . You cannot see the globe until the light from the flashlight falls on it. You cannot see the moon unless the light from the sun falls on it.	Have students report on different shapes seen, when observing the illuminated globe, from different positions around the globe. Relate the above observations to the moon phases observed.	K: Creative Moments, Creative Studies, Inc., "Sunrise" SFs: Phases of the Moon, Soc. for Vis. Ed.
Title: Sunlight on the Moon II Group Size: class Materials: ditto Procedure(s): . Circle shapes of the moon you have seen.	Probe student responses for depth of understanding.	District Resources



Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources
. Have students look for the moon each day and, when they find it, carefully draw its shape as they see it. This should be done on white paper, cut out and pasted on a square of dark paper. Add date. . On days when the moon cannot be seen because of clouds or rain, have students cut out a cloud or an umbrella. On days when the moon cannot be seen even though the sky is clear, have students write "Did not see" on their records. . Each day one student's record should be put on the board. Discussion: . Why do you suppose the moon appears to have different shapes? . Does the moon's shape change in a regular way or does it skip around? . How many days does it take to go from 1st quarter to full - from full to 3rd quarter - from new to full ? Title: Some Things to Try Group Size: class Materials: ball, light (overhead) Procedure(s): . Darken room and set up a single light in it (this light will represent the sun). Then hold a ball so that the light falls on it. Keep it out of your shadow. . Ask students questions about the ball, such as: "Notice that one side of the ball is lighted brightly--the other is in shadow. What causes this shadow? . Can you see the line between the light and dark sides of the ball? How much of the lighted side can you see? Does this change when you move the ball to a new position? In what position must you hold the ball in order to see: all of its lighted side? none of the lighted side? half of its lighted side?"	During procedure, discuss questions with students. Probe student responses for depth of understanding. Repeat activity when necessary. Have the students keep a continuous record of moon observations by drawing the apparent shape of the moon on a calendar.	TR: Elementary School Science, Addison Wesley District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

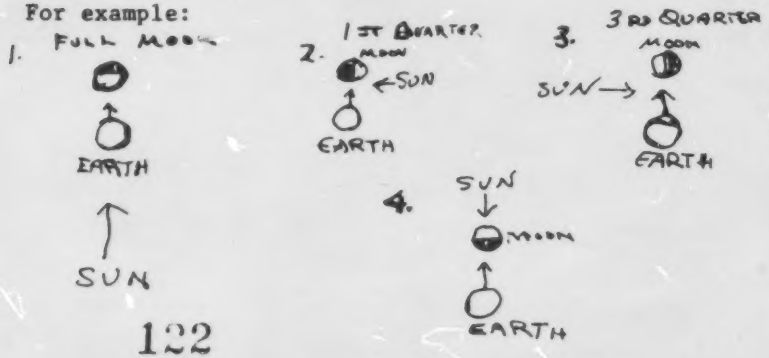
Student Learning Objective(s) A. The student knows there are several common cycles which influence his/her life, e.g., life cycles, earth-sun cycle, earth-moon cycle, water cycle, weather cycles. B. The student knows the progression of the phases of the moon. C. The student is able to identify hourly and daily position changes of the moon.

State Goal 1,4,10

District Goal

Program Goal 1,2,4

Related Area(s)

Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources
. Have students imagine the ball is a model of the moon and pretend their head is the earth and the light is the sun. . Ask: "In what position must you hold the model moon to see all of its lighted side? Half the lighted side? More than half its lighted side?" . Have students slowly move the model moon around them in a circle, trying to keep it out of their shadow. As the students do this, have them watch the lighted part and ask them what change they see in it. . As the students move the model moon, they see different amounts of its lighted side. Ask them if there is really any changes in how much of the moon is lighted. . Ask students: "Which way must you move the model moon to see more of its lighted side? To see less of its lighted side?" . Next, have the students hold the model moon so they can see all of its lighted side. Have them ask their friends to look at it from where they are and tell them how much of its lighted side they can see. For example:  		District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the term "cycle" means a series of events or operations that recur regularly and usually lead back to the starting point. B. The student knows the progression of the water cycle. C. The student is able to identify the major events in the progression of the water cycle (evaporation, transpiration, condensation).

State Goal	1,4
District Goal	
Program Goal	1,2,4

Related Area(s) _____

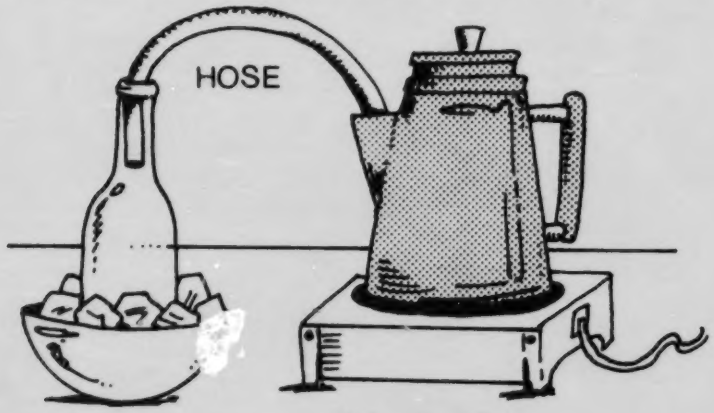
Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Water--Changing Form Group Size: class or small group Materials: ice (some for each child), tumblers (two for each group), very warm water Procedure(s): . Present the following riddle, accepting all explanations at this time: "I'm thinking of something you see and we use it every day. It changes shape easily and can appear and disappear right before your eyes. Some of it is in this room right now. What do you think it is?" . Give the students pieces of ice to hold in their hand. Ask them to observe and report what they see and feel. . Put some very warm water into one of each pair of glasses. Cover with another clean, dry glass, upside down. When condensation is visible in all top glasses, have children remove them and report what they feel and see. Discussion: . How did the solid ice change in your hand? . How did the liquid water get into the top glass? . What happens inside the two glasses? . How can water change from visible and back again?	Probe student responses to discussion questions for depth of understanding.	F: Water and What it Does, Brittanica, 1962 F: The Water Says, Churchill F: What Makes Clouds, Brittanica, 1965 F: Weather--Understanding Precipitation, Coronet, 1962 F: Water in the Weather, Academy, 1960 F: Rain, International Film Bur., 1961 F: Our Mr. Sun, (parts 1 & 2), Bell Telephone, 1956 F: Sky, McGraw-Hill, 1962 F: Water, Fountain of Life, Standard Oil F: Our Round Earth: Its Waters, Coronet TR: Ice Cubes, Elementary Science Study, McGraw-Hill Book Co. TR: The Great Perpetual Learning Machine, Jim Blake and Barbara Ernst, Little, Brown and Company, p. 111 TR: A Sourcebook for Elementary Science, Elizabeth B. Hone, Harcourt, Brace & World

Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources

Title: The Water Cycle
Group Size: class
Materials: film(s) demonstrating the water cycle (see resources), hot plate, coffee pot, ice, bowl, clear plastic tubing, water, bottle

Procedure(s):

- Heat some water in a pan or coffee pot and let it evaporate (do not boil dry). Ask students what they observed and what they think happened.
- Fit one end of a rubber hose over the spout of a coffee pot. Put the other end in an empty bottle. Stand the bottle in a dish of ice. Put water in the pot and boil it. Be sure to turn off the heat before the pot boils dry. Or, use a testtube, one-hole stopper, short piece of glass tube, and alcohol burner.
- Show film that describes the water cycle.



Discussion:

- What happened to the water in the coffee pot?
- What happened in the bottle?
- How is the coffee pot experiment like the water cycle we saw in the film?

See discussion.

Ask students to write a story describing what happens to the water in a pond or puddle when it dries up.

Fs: How Does Water Get Into the Air? (continued) Jam Handy
Fs: What Makes Things Dry Faster? Jam Handy
Fs: Where Do Clouds Come From? Jam Handy

F: Clouds, Film Assoc.

District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

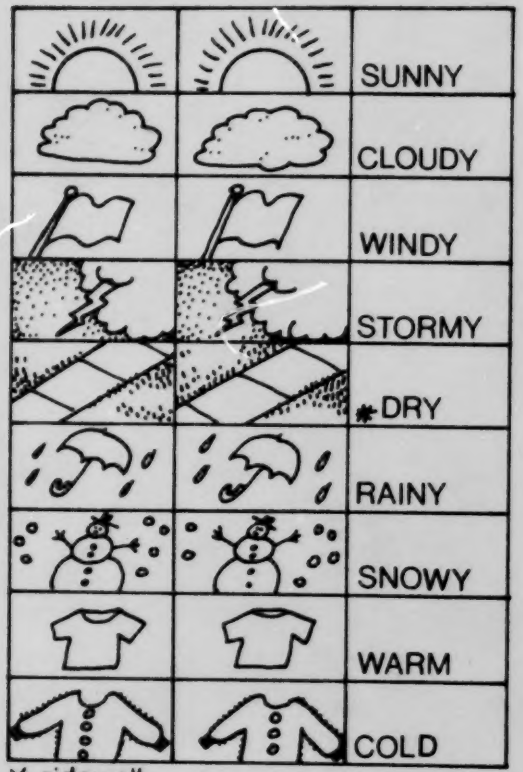
Student Learning Objective(s) A. The student knows there are several common cycles which influence his/her life, e.g., life cycles, earth-sun cycle, earth-moon cycle, water cycle, weather cycles.
B. The student is able to identify the progression of weather changes as the seasons change.
C. The student values weather changes for recreation and variation.

State Goal 2,5,9
District Goal
Program Goal 2,4,5

Related Area(s)

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Weather Walk Group Size: class Materials: none needed Procedure(s): . Tell students they are to observe the weather carefully enough to be able to describe the way it looks, smells, feels and sounds when they return to the classroom. Four or five minutes outside should be sufficient. . Help them describe: The condition of the sky (sunny, blue or gray or cloudy). The smell of the air. The sound of the wind. The temperature (hot, chilly, warm or cold). The moisture in the air (presence or lack of precipitation, fog or humidity). . Have the students draw pictures of what they observe	Ask students about the pictures they draw of their observations.	F: Rainshower, c. 1965, Dist.-Churchill F: Rain, c. 1961, Dist. Internat'l. Film Bur. F: A First Film on Wind, Film Assoc. F: How Air Helps Us, Coronet F: Introducing Air, Discovery Films Fs: Predicting Weather, Filmstrip of Month Club TR: Mini-Climates, Examining Your Environment, Winston Press TR: The Great Perpetual Learning Machine, Jim Blake and Barbara Ernst, Little, Brown and Company, p. 73
Title: Weather Records Group Size: class or individual Materials: scissors, glue, duplicated sheets Procedure(s): . Students cut out symbols and paste on record sheet. Cut out one of each set and paste on record sheet (sunny or cloudy; windy or not windy; dry, rainy or snowy, warm or cold).	Each day for a month, have a different student choose, cut and paste the appropriate symbols on a large calendar describing the weather each day.	

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources



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District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows there are several common cycles which influence his/her life, e.g., life cycles, earth-sun cycle, earth-moon cycle, water cycle, weather cycles.
B. The student is able to identify the progression of weather changes as the seasons change.
C. The student values weather changes for recreation and variation.

State Goal	2,5,9
District Goal	
Program Goal	2,4,5

Related Area(s)

Suggested Activities: Grade(s) 1-3	Suggested Monitoring Procedures	Possible Resources
Title: Weather Calendars Group Size: class Materials: tagboard for calendar, paste, scissors Procedure(s): . Keep a picture record of the weather for a month or longer as a class project. This is a way to increase the student's awareness that weather is constantly changing. . Pictures recording observations may be pasted or drawn with the days of the week. Student's can take turns recording. . Use the calendar to point out changes over longer periods of time as well as daily ones.	Review each student's record at the end of each week.	TB: I Want to be a Weatherman, Barbara Williams TR: The Book of Weather Experiments, Illa Podendorf, Children's Press Cassettes: Visiting a Weather Station, Troll Assoc. Fs: Understanding the Atmosphere Jam Handy
Title: Weather as an Occupation Group Size: whole class Materials: books about weather Procedure(s): . Read books about weather. . Discuss the occupation of a weather person. . Do experiments on how clouds form, why the sun shines, how wind, terrain, etc., influence weather.	Take students on a field trip to a weather station. Ask them to draw or write about their experience when they return.	F: Weather for Beginners, Coronet
Title: Seasonal Changes Group Size: individual Materials: paper, scissors, glue, magazines, other pictures of seasons	Ask students to place pictures representative of each season in order of occurrence. Have students draw the favorite activity they do during each season.	

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Students will make a scrapbook for each season. It can include a collage of pictures of the season, pictures of clothing, trees, animals, recreation and poems. . Variation: Can be done using bulletin boards as the seasons change.		District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows there are several common cycles which influence his/her life, e.g., life cycles, earth-sun cycle, earth-moon cycle, water cycle, weather cycles.
B. The student is able to identify the progression of weather changes as the seasons change.
C. The student values weather changes for recreation and variation.

State Goal	2,5,9
District Goal	
Program Goal	2,4,5

Related Area(s)

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Temperature Group Size: class or small group Materials: thermometer (Celsius or Fahrenheit), pencil and paper to record weather, graph paper Procedure(s): . Student will record the temperature each hour for a day in each of four locations: (1) air east side of school building, (2) air west side of school building, (3) water in a container on the south side of the school building, and (4) soil in a sunny spot on the south side of the school building. . Each student will construct a bar graph of the temperature changes in each location for the day.	Have students graph the temperature. Discuss the students' graphs at the end of the day.	FM: Thermometers: How We Use Them, BFA Ed. Media Fs: Measuring Temperature, Filmstrip of Month Club District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT - Working Copy

SUBJECT: Science

SPECIFIC AREA: Energy

	Page	Suggested Grade Placement	District Placement: K	1	2	3	4
The student knows:							
. that energy is the ability of an animal or system to bring about changes in its surroundings or in itself.	67	1-3					
. that energy may take many forms, e.g., heat, light, electrical, motion, mechanical, sound.	79-	1-3					
. that we depend on numerous sources of energy, e.g., animals, wood, coal, natural gas, oil, electricity, wind, sun	69	2-3					
. that one form of energy may be converted to another form of energy, e.g., heat to electrical, wind to mechanical, electrical to mechanical.	73	1-3					
. that energy may be transferred from one object or organism to another object or organism.	82-	3					
. that there are many job opportunities in science.		3					
The student is able to:							
. identify different forms of energy used in his/her daily experience, e.g., heat, light, electrical, oil, sun, sound.	79	1-3					
. identify energy chains in his/her daily environment, e.g., food chain: sun--grass--cattle--human.	89-	3					
. identify evidence of energy transfer, e.g., electricity to operate a motor to move an object, vibrating wire to produce sound.	81	3					
. identify variables that affect the amount of energy transferred, e.g., mass and velocity of moving objects.	83-	3					
The student values:							
. the developed ways of utilizing and conserving limited energy sources.	71	2-3					
. developing new ways of conserving limited energy sources.	71	2-3					
. developing new ways of using unlimited energy sources.	71	2-3					

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER _____

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 1-3

Student Learning Objective(s) The student knows that energy is the ability of an animal or system to bring about change in its surroundings or itself.

State Goal	1,2,4
District Goal	
Program Goal	2,3,4

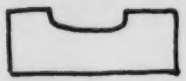
Related Area(s) Art & Music

Suggested Activities: Grade(s) 1

Title: Blocks and Sandpaper
Group Size: six students or small group
Materials: 6-12 small pieces of balsa wood, 6-12 pieces of sandpaper, medium grade

Procedure(s):

- Tell the students to rub the blocks of wood until they make dents or holes, or somehow change the shape of the wood. Students can sand out shapes and make boats.
  Vary the activity by having the students rub hands together until they get hot.



- Ask them to feel the wood--it's warm! Energy makes heat. Energy changes things. Your energy (muscles) made heat.

Discussion:

- Describe what happens when you throw a ball.
- Describe what happens when you clap your hands.
- When you rub your hands together, what makes them hot?
- Note: "Rubbing together" is friction which produces heat. Heat is a form of energy.

Suggested Monitoring Procedures

Possible Resources

TB: Rhythm Games from Ginn Co. Magic of Music or Clap Your Hands

F: Friction and Its Effects, Coronet

FL: Heat is Produced in Different Ways, Inter. Comm. Fms.

District Resources

Suggested Activities: Grade(s) 1	Suggested Monitoring Procedures	Possible Resources
Title: What Energy Is Group Size: entire class Materials: paper, pencil, worksheets & transparencies to reproduce energy pictures. Procedure(s): . Make overhead transparencies of pictures demonstrating where and how energy is used and by whom. Then discuss each transparency with the class. . Make worksheets of transparencies and use paper/pencil exercise to indicate user and energy source. Title: The Box Push Group Size: entire class Materials: two small boxes, sand, small cart Procedure(s): . Push an empty box and a box full of sand across the floor. . Place each box in turn on the cart and push. Discussion: . Ask the students to compare the difference in effort required to push each box on the floor. On the cart.	Be accepting of pupil responses but probe statements to determine the depth of pupil understanding. Make sure that pupils can distinguish between an energy source and an energy user (receiver).	TR: NSTA Energy Environment Mini-Unit Guide (copies of pictures on pp. 22-35) Energy pictures - available from ESD #109 District Resources

SMALL SCHOOLS PROJECT

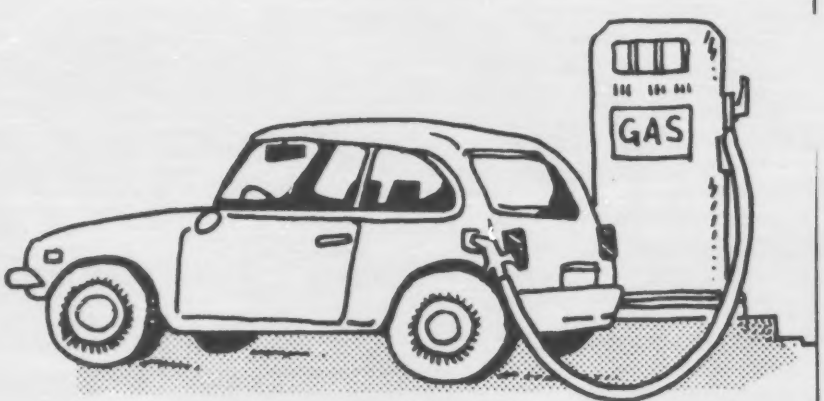
Suggested Objective Placement 1-3

Student Learning Objective(s) A. The student knows that energy may take many forms, e.g., heat, light, electrical, motion, mechanical, sound. B. The student knows that we depend on numerous sources of energy, e.g., animals, wood, coal, natural gas, oil, electricity, wind, sun. C. The student is able to identify different forms of energy used in his/her daily experience, e.g., heat, light, electrical, oil, sun, sound.

State Goal	1,4,5
District Goal	
Program Goal	1,3,6

Related Area(s)

Suggested Activities: Grade(s) 1	Suggested Monitoring Procedures	Possible Resources
Title: Drawing A Machine and Its Energy Source Group Size: entire class Materials: drawing paper, crayons or paints Procedure(s): . Have each student draw or paint a machine of his own choosing. Ask him/her to include the energy source or fuel supply.	Check the pupils' work for correct labeling of energy source.	TR: Creative Sciencing Ideas and Activities for Teachers and Children, Devito and Krockover, Little, Brown and Company TR: Energy-environment Mini-Unit Guide, NSTA F: Energy: Ability to Do Work, Cahill F: Energy & Man, McGraw-Hill



District Resources

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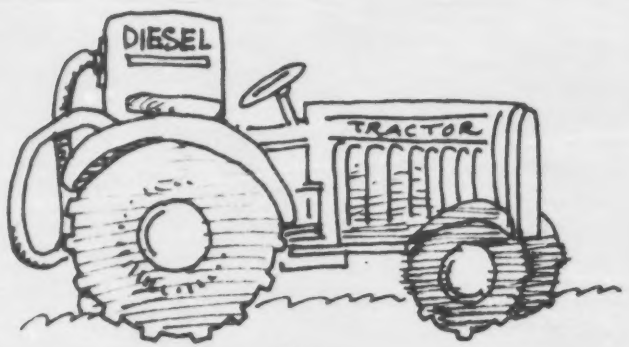
Suggested Activities: Grade(s) 1	Suggested Monitoring Procedures	Possible Resources



District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 1-3

Student Learning Objective(s) A. The student values developed ways of utilizing and conserving limited energy sources. B. The student values developing new ways of conserving limited energy sources. C. The student values developing new ways of using unlimited energy sources.

State Goal	2,4,10
District Goal	3,6,8
Program Goal	

Related Area(s)

Suggested Activities: Grade(s) K-1

Title: "Hey, It's Dark!"
Group Size: entire class
Materials: five single-cell flashlights and batteries, marking pen

Procedure(s):

- Start lighting all the flashlights. Mark the flashlights with marking pens: 1,2,3,4
- Then:

Leave	flashlight	No.	1	on for	1 hour
"	"	"	2	" "	2 hours
"	"	"	3	"	all day
"	"	"	4	"	overnight

- Try the numbered flashlights in order on the following day. Have the students (with teacher) chart which light and how long they last following preceding day's procedure.

Discussion:

- Why did numbers 3 & 4 not light up again?
- Student responds that he/she used up the battery (teacher can call it stored energy).
- What happens when you leave all the lights in your house on all day and all night?
- What would happen if everyone did? (At this level, we will not distinguish much between battery and generator sources).

Suggested Monitoring Procedures

Record student responses on the blackboard.

Change the concept to dripping faucets and discuss water conservation.

Possible Resources

Notes and Tunes (Music), Malvina Reynolds.
The Faucets Are Dripping in Old New York City.

District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 1-3

Student Learning Objective(s) The student knows that one form of energy may be converted to another form of energy, e.g., heat to mechanical--and that heat is a form of energy.

State Goal 1,2

District Goal

Program Goal 2

Related Area(s)

Suggested Activities: Grade(s) 1-2	Suggested Monitoring Procedures	Possible Resources
Title: Angel Chimes Wheel and Candles Group Size: entire class--members used as demonstrators to light and snuff out candles Materials: one or two sets of Angel Chimes (cost about $1.00), small candles Procedure(s): . Ask questions about what may happen (probably some students know from home): (a) "Will the candles burn up the bells and the angels?" (No) "Let's light the candles and watch what happens." (b) "What happens when the candles are lighted?" (They burn--they are hot) (c) "Does a candle store the heat (energy) something like the way a flashlight battery does?" . Have the students listen to the chimes. (a) "What happened first? The candle heated the air and the rising warm air moved the angels." (b) "What happened next? The angel's wand hit the bell and made the noise of the chimes." . Directions: Snuff the candles one by one and observe reactions. Discussion: . What will happen if one candle is put out? Two? . Will it work again if we light all the candles? . What makes the chimes move?	Follow up students' responses. Probe for depth of understanding. Have the students repeat the experiment and tell other students what is happening.	TR: Concepts in Science, green Newton edition, Level 3, Harcourt, Brace & World, pp. 1-179 District Resources

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Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 1-3

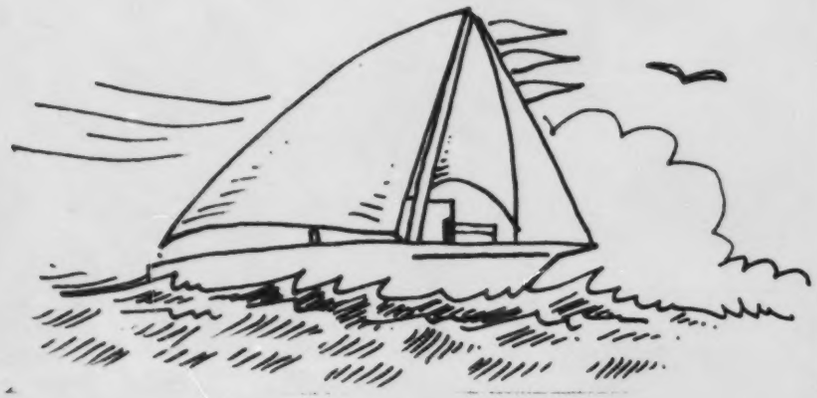
Student Learning Objective(s) A. The student knows that one form of energy may be converted to another form of energy, e.g., wind to mechanical, electrical to mechanical, heat to electrical.

State Goal 1,2

District Goal

Program Goal 2

Related Area(s) Social Studies

Suggested Activities: Grade(s) 1-2	Suggested Monitoring Procedures	Possible Resources
Title: Sailboat Or Windmill Group Size: entire class or individuals Materials: plastic, clay or paper Procedure(s): . Make model windmill or use pin wheels. Show the model to classmates and demonstrate how the wind makes it move. Discussion: . Does wind energy work when the wind is still? 	Observe student behavior. Note discussion. Probe student responses to questions--seek depth of understanding.	TR: 1,2,3 Concepts In Science, Newton F: Magnetic Fields and Electric Current, Bailey Film Association, 1973 F: Electricity for Beginners, Coronet F: Electricity and How It Is Made, Britannica TR: The Great Perpetual Learning Machine, Jim Blake and Barbara Ernst, Little, Brown and Co., pp. 114 -117 District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

SMALL SCHOOLS PROJECT

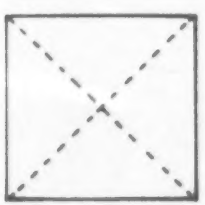
Suggested Objective Placement 1-3

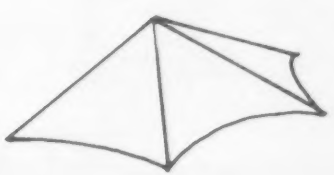
Student Learning Objective(s) A. The student knows that one form of energy may be converted to another form of energy, e.g., wind to mechanical, electrical to mechanical, heat to electrical.

State Goal	1,2
District Goal	
Program Goal	2

Related Area(s) Social Studies

Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources
Title: Making An Electromagnet Group Size: groups of 2 Materials: dry cell battery, uninsulated wire (prefer copper), nail and paper clips Procedure(s): . Coil the bare copper wire around the nail and attach both ends of the wire to the battery. Place the paper clips close to the nail and watch them be attracted to the magnet. Discussion: . What happens if one end is unhooked from the battery? . What would happen if the battery were reversed? . Variation: Draw or find pictures of some things that need electrical energy to function. . Make a display of the things you found.	See Variation. Note the types of pictures or items in the display.	F: Electromagnets: How They Work, Britannica TR: The Great Perpetual Learning Machine, Jim Blake and Barbara Ernst, Little, Brown and Company, p. 119 TR: A Sourcebook for Elementary Science, Elizabeth B. Hone, Harcourt, Brace and World, p. 352-3, 379-80 TR: Science in Elementary Education, Peter C. Gega, John Wiley & Sons, p. 126
Title: Making An Electric Motor Group Size: groups of 2 Materials: square of typing paper, 4 paper clips, pencil, book, nail, electromagnet with drycell battery Procedure(s): . Fold a square of paper from corner to corner. Pinch the folds to make into a star shape.	See Discussion. Have students predict what will happen. Conduct and record results of the experiment. Suggestion: Have the student set up variations of this motor using designs other than the star.	District Resources





Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources

. Slide a paper clip on each point of the star. Stand a pencil straight up in a book (eraser down). Put the star on the pencil point. It will turn easily. (A strong rubber band around the book may help the pencil stand)

. Hold a nail electromagnet so that the clips pass by about one inch from the end of the magnet.
. Turn on the electromagnet and the nearest clip will move toward it. The star will begin to turn.
. When the clip is near the magnet, turn off the magnet and let the clip swing past. As the next clip comes near, turn on the magnet and give that clip a pull.
. If you time your pulls well, the star will turn around. Now you have an electric motor.

Discussion:

. What happens if you hold your magnet too close to a clip? What happens if you hold the magnet too far away?

District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows that energy may take many forms, e.g., heat light, electrical, motion, mechanical, sound. B. The student knows that we depend on numerous sources of energy, e.g., animals, wood, coal, natural gas, oil, electricity, wind, sun. C. The student is able to identify different forms of energy used in his/her daily experiences, e.g., heat, light, electrical, oil, sun, sound.

State Goal	1,4,5
District Goal	
Program Goal	1,3,6

Related Area(s) _____

Suggested Activities: Grade(s) 2-3

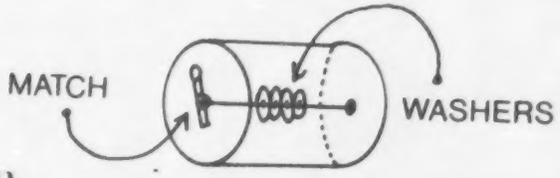
Title: Wind-up Toys
Group Size: small groups
Materials: assorted spring or rubber band wind-up toys

Procedure(s):
- The student winds up the toy and observes the movements as the spring or rubber band unwinds.

Discussion:
- What made the toy move?
- What type of energy does the spring or rubber band represent? (Mechanical motion).

Title: The Obedient Can
Group Size: small group
Materials: coffee can and plastic lid, rubber band, weights (lead sinkers or washers), two wooden kitchen matches, nail and hammer

Procedure(s):
- Student punches a hole in the bottom of the coffee can and another in its plastic cover. Both holes must be centered. Smooth the holes with a file. Cut a large rubber band and thread on 5 to 10 metal washers. Tie the ends of the rubber band together. Thread the rubber band through the hole in the bottom and top of the can. Put the broken end of a matchstick through the rubber band at each end. Close the



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Suggested Monitoring Procedures

Discussion: Probe pupil responses for depth of understanding.

Possible Resources

F: Sun's Energy, Academy, 1960.
F: Laws of the Conservation of Energy and Matter, Coronet, 1958.

TR: The Great Perpetual Learning Machine, Jim Blake and Barbara Ernst, Little, Brown and Company, pp. 124-127

K: Creative Moments, Creative Studies, Inc., "How Fast Does the Wind Blow?"

District Resources

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
can. Roll it on the floor. The rubber band will wind up like a spring when the can is rolled on the floor. The can will then roll back because of the accumulated energy in the twisted rubber band. Discussion: . Why did the can come back? . What will happen if you use a different size rubber band? . What will happen if you move the weight closer to the end? . Does the size of the can make any difference? Title: Plaster of Paris Group Size: Learning Center Materials: plaster of Paris, water and a milk carton Procedure(s): . The student mixes water and plaster of Paris in a carton. As the plaster hardens, it gives off heat. The student holds the carton and makes observation. Peel off the carton and the object. Discussion: . What happened as the plaster of Paris hardened? (heat was produced) Title: Food Color in Water Group Size: entire class Materials: beakers or jars of cold water, hot water, food coloring, candle or other heat source Procedure(s): . Teacher carefully puts food coloring into some beakers of cold water and hot water. Students observe the food coloring in the two beakers, comparing the differences in motion. Discussion: . What happened to the food coloring in the cold water? . What happened to the food coloring in the hot water? . Why did the two solutions act differently?		TR: Practical Guide to Third Grade Activities, Milliken Publishing Company, "Hot and Cold Colors," pp. 111-112 F: Heat and How We Use It, Britannica

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows that energy may take many forms, e.g., heat, light, electrical, motion, mechanical, sound. B. The student is able to identify evidence of energy transfer, e.g., electricity to operate a motor to move an object, vibrating wire to produce sound. C. The student values developing new ways of conserving limited energy sources.

State Goal	1,4,5
District Goal	
Program Goal	1,3,6

Related Area(s)

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Hot Ping Pong Balls Group Size: entire class Materials: two large pans, eight ping pong balls, one 2-burner hot plate Procedure(s): . Place four ping pong balls very carefully in one pan of cold water. Set aside. Now place four more ping pong balls in the other pan of cold water. Set one pan on the burner and heat very slowly. Discussion: . What do you think will happen? (Water will get hot) . Will anything happen to the four ping pong balls which have been placed on the burner? Will they cook? (No) . Students will see the water boil and ping pong balls move as the water becomes hotter. . What makes the balls move? (The bubbles, the heat) . Does the heat make the water move? Does the heat make the balls move? . IS HEAT ENERGY? . Does energy move things? Remove the pan from the burner; set aside to cool. Observe the ping pong balls in the pans and ask the students to compare the difference between the two pans. When the pan is removed from the burner note on the board when (what time) the balls are still moving and note when they stop moving. Ask the students if they want to repeat the demonstration.	Record students' responses (on blackboard) and discuss them. Attempt to elicit further responses.	F: Magnetic Fields and Electric Current, Bailey Film Association, 1973 District Resources

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Dependent On Energy Group Size: entire class Materials: paper, crayons, pencils, chalk, paint Procedure(s): . Have the students write stories about what their lives would be like without different forms of energy, e.g., electricity, wind, heat, water or sound. . Have them make up plays to show life without a type of energy. . Have them draw or paint a picture to show the above. Discussion: . What if the electricity goes off tonight? . What if the water goes off?	Record students' responses to questions. Have students collect pictures of different kinds of energy and energy in use. Then have them make a scrapbook.	FM: Energy Does Work, Coronet FM: Electricity and How It Is Made, Britannica District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 3

Student Learning Objective(s) A. The student knows that energy may be transferred from one object or organism to another object or organism. B. The student is able to identify evidence of energy transferred, e.g., electricity to operate a motor to move an object, vibrating wire to produce sound. C. The student is able to identify variables that affect the amount of energy transferred, e.g., mass & velocity of moving objects.

State Goal 1
District Goal
Program Goal 5

Related Area(s) Social Studies

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Collisions Group Size: small groups or Learning Center Materials: steel spheres, some type of plane that can be included (e.g., board), carbon paper, ditto paper Procedure(s): . Roll spheres down the inclined plane. . Place lighter, heavier or same-size spheres in the path of the on-coming sphere. . Let them collide. . On impact record distance & direction travelled by both spheres. Discussion: . What happens when a heavier sphere hits a lighter sphere or vice versa? . How does changing the speed of the on-coming ball alter things? . Change the elevation of the plane. What are the results? . Note: If the spheres are heavy enough, pressure sensitive carbon paper placed over ditto paper will record the track left by the balls as they react to the collision. . Variations: Vary the surface texture of the inclined board. Corduroy, silk, cotton, etc. How does this affect the speed? Roll sphere in oil or wax it.	Task: The students will predict what will happen (by drawing tracks) when two rolling spheres of unequal mass collide. The students will verify their predictions by comparing their drawings with the actual track of the spheres recorded by the carbon paper (or used ditto master) placed under the path of the rolling spheres.	TR: 1,2,3 Creative Sciencing, Davito-Krockover TR. Science Curriculum Improvement Study, "Interaction and Motion" F: Forces, Britannica, 1961 District Resources

Suggested Activities: Grade(s) ___ ___	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 3

Student Learning Objective(s) A. The student knows that energy may be transferred from one object or organism to another object or organism. B. The student is able to identify evidence of energy transferred, e.g., electricity to operate a motor to move an object, vibrating wire to produce sound. C. The student is able to identify variables that affect the amount of energy transferred, e.g., mass & velocity of moving objects.

State Goal	1
District Goal	
Program Goal	5

Related Area(s) Social Studies

Suggested Activities: Grade(s) 3

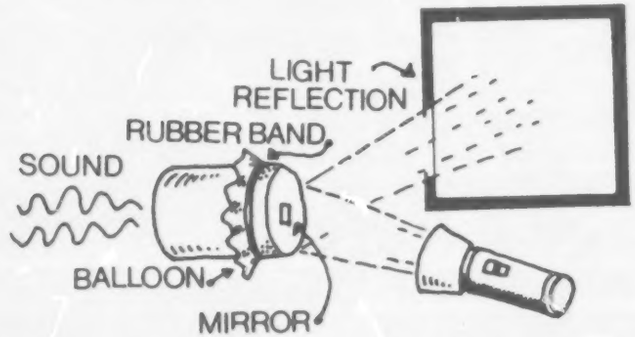
Title: Pendulums
Group Size: small groups or Learning Center
Materials: two pendulum bobs, string board with a coffee cup hook to hold the bob strings, two chairs to hold the board

Procedure(s):

- Allow two similar bobs to hang on the same lengths of string from the board hook. Let one remain at rest and swing the other into an arc of approximately 30°.

Discussion:

- What will happen when the moving ball collides with the still ball?
- Demonstrate to the students by swinging one of the lengths of string.
- What happens when we raise both bobs and release them simultaneously?
- Keep the angle of incidence small so the balls hit each other head on.



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Suggested Monitoring Procedures

Have the students predict what will happen after the collision of the two balls. Then discuss any differences between the predictions and what actually happened.

Instruct the students to draw diagrams to show what happened when they caused a moving ball to collide with a resting ball.

Ask the students to tell orally or in writing why the reactions happened as they did.

Possible Resources

FL: 8-Pendulums, SRA
FL: Pendulum and the Peg, SRA
FL: Pendulums, Thorne Films

TR: Pendulums, Elementary Science Study, McGraw-Hill Book Co.
TR: The Great Perpetual Learning Machine, Jim Blake and Barbara Ernst, Little, Brown and Company, pp. 122-123

G: Pen-doodler, Magic Rainbow, Multi-Marketing (available at Pacific Science Center)

District Resources

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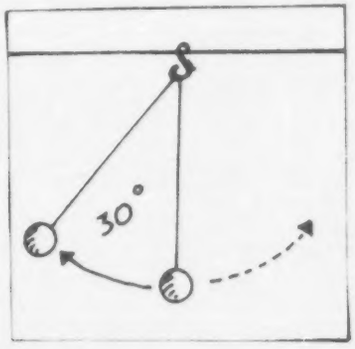
Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources
Title: The Sound of Music Group Size: entire class Materials: a small fruit can with both ends removed, sheet of rubber membrane from a balloon, a broken fragment of a pocket mirror, glue, rubber band and a flashlight Procedure(s): . Over one end of the small fruit can tightly stretch the balloon membrane tightly and secure it with the rubber band. . Glue the fragment of the mirror to the stretched balloon; position the mirror fragment slightly off center. . Darken the room and move the can near the blackboard. Then hold it away from and at an angle to the board. Shine the beam of the flashlight so that it strikes the mirror and reflects on to the blackboard as shown in the figure below. . Have someone speak, sing or softly blow a whistle into the can. . Observe and describe the reflection cast on to the board.  Discussion: . Does singing vowels loudly in succession change the reflection? Contrast the consonants. . How does the reflection vary in relation to the strength of the sound?	See Discussion. Observe the students' answers. Have the students predict what would happen if you pointed the light into the open end of the can and spoke into the ballooned end. Probe responses for depth of understanding.	Fs: Reflections of Light, Pop. Sci. A-V Inc. District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 3

Student Learning Objective(s) A. The student knows that energy may be transferred from one object or organism to another object or organism. B. The student is able to identify evidence of energy transferred, e.g., electricity to operate a motor to move an object, vibrating wire to produce sound. C. The student is able to identify variables that affect the amount of energy transferred, e.g., mass & velocity of moving objects.

State Goal 1

District Goal

Program Goal 5

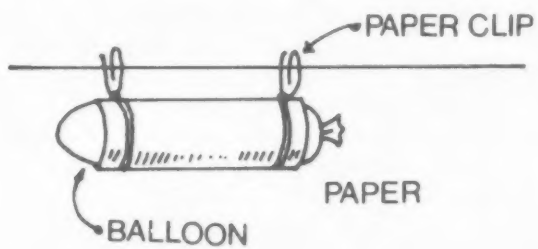
Related Area(s)

Suggested Activities: Grade(s) 3

Title: Make A Rocket
Group Size: entire class or Learning Center
Materials: balloon, paper, string, paper clips, wire, two poles or trees

Procedure(s):

- Blow up a long balloon. Fasten the end. Make a tube out of paper and place the balloon inside the tube so that it is tight against the sides.
- With string fasten two paper clips to the tube of paper.
- Stretch the wire between two poles or trees and fasten your rocket to the wire by means of the paper clips.
- To fire the rocket unfasten the balloon.



Discussion:

- What kind of energy transfer is this? How does it work?
- What is the energy source?
- What could be done to the rocket to slow it? To make it go faster?

Suggested Monitoring Procedures

Have individual students demonstrate the foregoing activities and have the other students identify the type of energy transfer.

Possible Resources

TR: Science Adventures, Frasier, MacCracker & Dectier.

F: Jet & Rocket Engines, A-V Cent. Indiana U.

Fs: Physical Reactions, Film St. of Month Club

District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) The student is able to identify energy chains in his/her daily environment, e.g., food chain: sun--grass--cattle--human.

State Goal 10

District Goal

Program Goal 1,3

Related Area(s) Art, Math, Cooking, Reading

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: The Sun, Cows and Us Group Size: entire class (period - 1 week) Materials: pictures of meadows, grass, silos, barns, cows, farms, dairy-milking machines, all milk producing mammals--with pictures of them on display on class bulletin boards for at least a week. Collect Farm Journal, Ranger Rick, National Geographic, Western Farmer - other magazines so the students can clip pictures. Raw milk, heavy cream, jars, crackers Procedure(s): . Collect, cut pictures and make scrapbooks showing food chain scenes (grass, cow, etc.). . Show films, pictures, film strips of milk-producing mammals grazing in the wild pastureland. . Then discuss what happens to the herds (wild) when the grasslands (pasture) are turned into farms, cities, roads. . Show students cows milk so they can see the cream. . Make butter - everyone gets to shake the quart jar, help take off the buttermilk (they can drink it if they want to), wash butter, spread it on the crackers and eat them. All the students should copy the recipe for butter making from the board. . Measurements--directions followed if home freezer is available could make ice cream.	Cut pictures from magazines separate and classify the dairy food products. Given worksheet pictures and names of various foods, the students circle (identify) the dairy foods.	PS: The Washington State Dairy Council will send whole sets/pictures of all milk producing animals for bulletin board display. Recipes, career education books also sent upon request K: My Friend The Cow, Lois Lenski. Good Snacks For Me, Washington State Dental Council Publication District Resources

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
. Use worksheets and identify dairy food. Discussion: . What happens to grass crops when there is no rain? . Where does the grass(food) come from? Discuss and elicit questions about food chain--sun (energy)--seeds--rain--grass.		District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 3

Student Learning Objective(s) The student is able to identify energy chains in his/her daily environment, e.g., food chain, sun--grass--cattle--human.

State Goal 10

District Goal

Program Goal 1.3

Related Area(s) Art, Math, Cooking

Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources
Title: Corn And Hens And Eggs And People Group Size: entire class (period 2-3 days) Materials: chick scratch, feed corn (for one day a student or teacher brings in a chick and/or hen in a pen), eggs (incubator maybe if fertile eggs are available) or pictures from books--picture series in place of chick and hen Procedure(s): . Discuss the food chain represented by the egg, chick, and hen. . After all the animals, etc. have been returned home, put up series of pictures and have students write a story or illustrate a story of the corn, chicken, egg, people food chain.	Have the student organize the food (energy) chain when given pictures of grain, corn, eggs, hens, people. Ask questions: What if there wasn't enough sunshine to grow corn? Or enough rain? Teacher acknowledges all student responses and lets the rest of the class discuss them.	National Dairy Council TR: Exploring Science, Laidlaw District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

SUBJECT: Science

SPECIFIC AREA: Environment

	Page	Suggested Grade Placement	K	1	2	3	4
The student knows:							
. there is order to everything in our environment.	95	2-3					
. interdependence means two or more things supporting each other in some way.	97-	2-3					
. interaction means at least two things acting on one another.	103-	2-3					
. the place an organism lives in called its "habitat."	107	2-3					
. change in the organism to meet changing environmental conditions is called "adaptation."	109	2-3					
. "population" means organisms of the same type living in a definable area.		2-3					
. clean air and water are essential to maintaining a healthful environment.	111-	K-3					
. non-living things obtained from the earth are composed of minerals.	119	2-3					
. rocks are composed of minerals.	119	2-3					
. soil is mostly composed of weathered rocks.	121	2-3					
. ~~there are many job opportunities in science.~~	101-	K-3					
The student is able to:							
. identify order in nature.	95	K-3					
. identify examples of interdependence in nature.	97-	2-3					
. describe the function of an organism's habitat, e.g., provides shelter, food, conditions for reproduction.	107	2-3					
. identify examples of adaptation in our environment, e.g., different colors, different beak forms, different forms of locomotion, different diets, different leaf forms, different root patterns.	109	2-3					
. identify the effects of air and water pollution on plants and animals in restricted environments.	111-	K-3					
. identify several common minerals, e.g., quartz, feldspar, mica.	119	2-3					
. identify several common rocks, e.g., granite, basalt, limestone, shale.	119	2-3					
. identify several common soil forms, e.g., clay, loam, sand.	121	2-3					
. demonstrate how they can conserve and enjoy their environment.	123	2-3					
The student values:							
. that order enables us to organize and function within our environment.	95	2-3					
. interdependence and interaction as necessary to the survival of an environment.	97-	2-3					
. change and adaptation as necessary to the survival within an environment.	109	2-3					

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER _____

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows there is order to everything in our environment B. The student is able to identify order in nature. C. The student values that order enables us to organize and function within our environment.

State Goal	4,5
District Goal	
Program Goal	4

Related Area(s) See symmetry activities involving natural objects such as leaves. See activities involving cycles.

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Evidence of Rhythmic Behavior in Animals Group Size: entire class or small group Materials: hamsters, mice, cockroaches Note: These are nocturnal animals and if possible they should be kept at home and a record of observations kept there. If this is not practical, certain types of behavior can be observed at school Procedure(s): . Have students observe and record the animal's behavior and the times and conditions under which the behavior occurs. . Outside the classroom students can find evidence of rhythms in plants, animals and people. Dates and times can be recorded and comparisons made, e.g., date buds on a certain tree open. Keep a record from year to year. Discussion: . Do your records show a certain rhythm to the animal's behavior? . Does keeping the animal in a dark closet make a difference? . Does sleep begin or end at a certain time each day?	Have student give an example of order in nature; in his/her daily life; and/or in the universe. Have student write a story entitled, "The Day the Clocks Ran Backwards."	F: Spring Brings Changes, Churchill F: The Rhythm of Life, MacMillan, 1972 TR: The Great Perpetual Learning Machine, Jim Blake and Barbara Ernst, Little, Brown and Company, pp. 42-51 TR: Practical Guide to Third Grade Activities, "Cricket Thermometer," Milliken Publishing Company, pp. 106-108 TR: The Curious Gerbils, Elementary Science Study, McGraw-Hill Book Company TR: Animals in the Classroom, Elementary Science Study, McGraw-Hill Book Company

Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources
Title: Biological Rhythms in Seedlings Group Size: entire class or small group Materials: bean seedlings, bright light Procedure(s): . Place bean seedlings in a dimly lighted area. Give them a few minutes of brighter light at precisely the same time each day. . After about two weeks discontinue the periodic lighting. The leaves will continue to turn upward at the usual hour for several succeeding days, indicating that a circadian rhythm had been established. . Note: In scientific research, when an impressive discovery is reported, other scientists verify the findings by repeating the experiments. Students may repeat the experiment with other plants. Discussion: . Is the response more pronounced if the light source is an ultraviolet sunlamp, an ordinary lamp, an infrared heat lamp or momentary light from the window? . Does the wattage make a difference? . Is a colored light as effective? What color? . Can a rhythm of 23 (or 25) hours be established?		District Resources
Title: Rhythmic Behavior in Children Group Size: individual Materials: none needed Procedure(s): . Have students keep a record of certain of their own behaviors and the time they occur each day, e.g., recess, lunch, get sleepy, get hungry, get out of seat, go to the restroom, get a drink, etc. Discussion: . Do certain behaviors occur in a rhythmic pattern? . What would happen if you set your clock ahead four hours and got up at 3 a.m. instead of 7 a.m.? . What would happen if you covered the clock and/or the windows? (Try it in your classroom.)		

SMALL SCHOOLS PROJECT

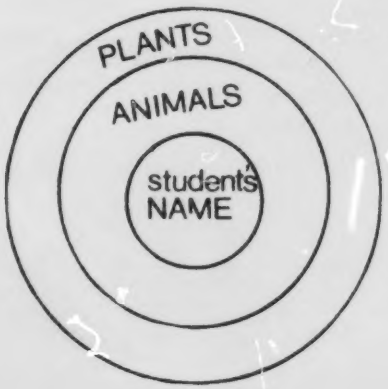
Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows interdependence means two or more things supporting each other in some way. B. The student is able to identify examples of interdependence in nature. C. The student values interdependence and interaction as necessary to the survival of an environment.

State Goal	4,5,6
District Goal	
Program Goal	3,4,5

Related Area(s) See activities dealing with the function of plants and animals which deal with acquiring food.

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Developing a Food Chain Group Size: entire class or small group Materials: pictures of animals in their natural habitat Procedure(s): . Choose an animal represented in the classroom (or a picture) and write it's name on the board. Ask students what this animal might eat and what might eat this animal. Corn ——→ Mouse ——→ Fox . Allow students to make up food chains from the picture or past experience. Ask: "What is the longest food chain you recorded?"	Have students draw, state or write out several food chains which include human beings.	F: Swimming Hole, King Screen, 1971 F: Bacteria, Encyclopedia Britannica Educational Corp., 425 N. Michigan Ave., Chicago, Ill. 60611, 1962 F: Nature Is For People, Aims, 1969 F: Why We Need Each Other: The Animals' Picnic Day, Learning Corp. Am, 1973 F: Fresh Water Plankton and the Chain of Life, Classroom (Fleet) 1968 F: Animal Predators and Balance of Nature, Journal Films Fs: This Earth: Everything Fits Together Fs: Back to Plants: A Probe Into a Source of Energy, Harcourt, Brace & World Fs: Food for Living Things, Britannica Fs: Living Things Need Food, Eye Gate TB: Insects & Plants, Elizabeth Cooper, Harcourt, 1963 TB: Science Projects in Ecology, Seymour Simon, Holiday House, pp. 63-66 K: Outdoor Biology Instructional Strategies, Lawrence Hall of Science, Berkeley, Ca, "Food Chain Game"
Title: Developing a Food Web Group Size: small group or entire class Materials: worksheet Procedure(s): . Diagram a food web. . Have students draw ten randomly spaced circles on a sheet of paper. Have them write the name of an organism from a chosen habitat in each circle (e.g., water environment--algae, tadpoles, water fleas, snails, minnows, bluegills, frogs, trout, bass, crayfish). . Have students draw an arrow from each organism to every other organism that may depend upon it as a source of food.	Give students a hypothetical situation involving the reduction of the insect population. Observe their deduction of what effect this will have on animals depending on food from the insects.	

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
. Have students place an X over one organism, which is low on the food chain, to indicate that all members have been removed from the community. Have them draw small X's over each arrow pointing away from that circle. . List animals that lost a source of food when one organism was removed. . Have students list the organisms that are less likely to be eaten when the organism was removed. . For each organism that lost a source of food, have students make a list of the organisms that depend upon it for their food. Discussion: . How did removing one organism affect the food web? . Why might use of insecticides cause a decrease in the population of eagles, even though eagles do not eat insects? Title: A Human Food Web Group Size: entire class, then individual Materials: chalkboard or chart paper and/or worksheet for each student  	Have students state that we could survive on plants alone, but if there were no plants there would be no food for animals and, therefore, no food for humans.	District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows interdependence means two or more things supporting each other in some way. B. The student is able to identify examples of interdependence in nature. C. The student values interdependence and interaction as necessary to the survival of an environment.

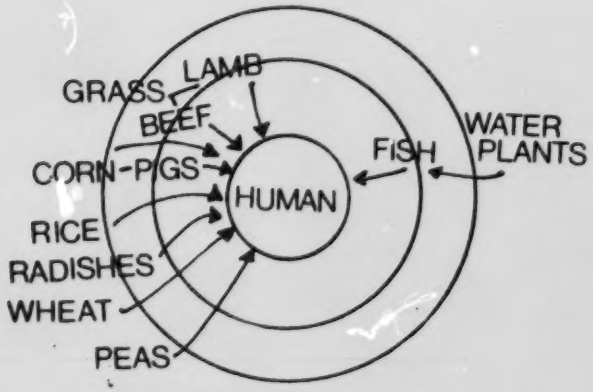
State Goal	4,5,6
District Goal	
Program Goal	3,4,5

Related Area(s) See activities dealing with the function of plants and animals which deal with acquiring food. Also Social Studies.

Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources

Procedure(s):

- Draw a chart (see diagram) and write "human being" in the center. Explain to the students that the animal populations will be written on the inner circle and the plant populations on the outer circle.
- Ask students to name foods that humans eat and place their suggestions on the appropriate circles. Have students tell you how to draw the arrows to represent the food relationships.
- Ask what the animal populations eat and add them to the appropriate circles.



District Resources

Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources
. Have students follow the same procedure to make a food web for themselves. Discussion: . (Block out all the animal populations.) . Ask: "Could humans survive if there were no animal populations? Could humans survive if there were no plants?"		District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows interdependence means two or more things supporting each other in some way. B. The student knows there are many job opportunities in science.

State Goal	4,5,6
District Goal	
Program Goal	3,4,5

Related Area(s)

Suggested Activities: Grade(s) 2-3

Title: Worker Roles in an Ant Colony
Group Size: entire class
Materials: ant colony, resources on ants

Procedure(s):
- Have students observe an ant colony.
- Have students read about and discuss roles of the ants.

Discussion:
- What happens if a queer ant stops laying eggs?
- What happens if the field ants stopped bringing in pieces of leaves?
- What happens if carpenter ant neglects his young?
- Variation: Ant activity based on ant study.

Suggested Monitoring Procedures

Have students list the relationship between the interdependency of work roles in an ant colony and our working society.

Possible Resources

TB: The Wonder World of Ants, Bronson
TB: The Story of Ants, Shuttlesworth-Swain
TB: Ants Are Fun, Mildred Myrick Harper and Row

F: Why We Need Each Other: The Animals' Picnic Day, Learning Corp. of Am., 1973

Fs: Food For Big City, Big City USA Series, Eye Gate House

District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows interaction means at least two things acting on one another. B. The student values interdependence and interaction as necessary to the survival of an environment.

State Goal	1,2,4
District Goal	
Program Goal	3,4

Related Area(s) Social Studies

Suggested Activities: Grade(s) 2-3

Title: Building a Mini-Generator--to study decomposition process

Group Size: two or three

Materials: coffee can (1 or 2 lbs.), 2 small concentrated orange juice cans, fertilizer pellets (ammonium sulphate), hammer, nail, pie plate (aluminum), plant refuse (chopped or shredded garbage or grass clippings), soil, wood ashes, or barbecue grill refuse

Procedure(s):

- Two small concentrated orange juice cans with ends removed are butted together and taped, producing a tall thin cylinder.
- Fill the cans with soil to help brace them and to aid in making clean edged holes. Holes are punched in the sides of the cans to aid in aeration (5-8 holes).
- Remove dirt after puncturing.
- Remove one end from a coffee can. Punch holes in sides for ventilation. Place juice can cyclinder in the center of the coffee can. Place following materials, layer by layer, into the coffee can in order given:
  - 1½" soil
  - 3-4" fertilizer mixed with wood ash
  - 3-4" of shredded or chopped vegetable refuse (e.g., peelings, coffee grounds, eggshells, peanut shells, grass clippings, small amount of newspaper, clover, etc.)
- Repeat these layers until the top of the coffee can is reached. (Do NOT compact material.) If material has fallen into the juice can cylinder, remove it.

Suggested Monitoring Procedures

Have students record and interpret an observation chart.

Check on observation record.

Have students state the changes in the can which occur due to interaction.

Possible Resources

F: Why We Need Each Other: The Animals' Picnic Day

TB: Save the Earth! An Ecology Handbook for Kids, Betty Miles, Alfred A. Knopf, publisher

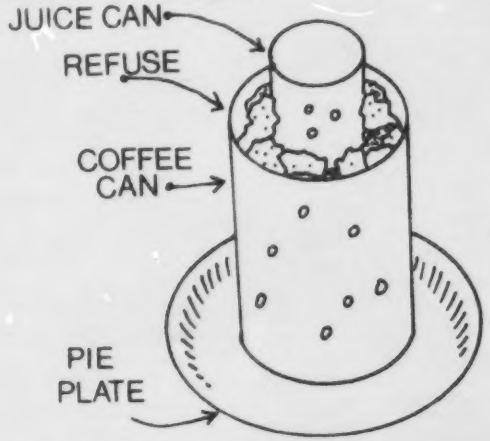
NL: "ECO-NEWS-Where Does All the Garbage Go?" Vol. 5, No. 5, Environmental Action Coalition

District Resources

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources

. Place the coffee can on the aluminum pie plate to collect seepage water. If soil and refuse materials are extremely dry, water may be added so the materials are damp, not wet. Wait two or four days before adding anymore water or stirring. This allows the organisms a chance to multiply.

. Note: If generators develop an odor, this is due to a lack of aeration because of too tightly packed compost or too much water.



. Make dittoed observation record with above picture on it.

DATE	CHANGES OBSERVED

. Stir the material every three or four days and record changes and observations about the material.

Discussion:

. Why is the can hot? Why are changes occurring?

District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows interaction means at least two things acting on one another. B. The student values interdependence and interaction as necessary to the survival of an environment.

State Goal	1,2,4
District Goal	3,4
Program Goal	

Related Area(s) Art

Suggested Activities: Grade(s) 2-3

Title: Interaction Collection
Group Size: entire class
Materials: paper, glue, magazines

Procedure(s):
- Have students make scrapbooks to show things interacting. Explain to them that interaction means things acting on one another and give an example.
- Have students draw or collect pictures of as many interaction examples as possible.

Title: Soil, Plant, Water Interdependence for Survival
Group Size: Learning Center, class or small group
Materials: 2 pans of same size (e.g., rect. cake pans), soil, small clumps of grass, water

Procedure(s):
- Put dirt alone in first pan and in second pan put grass clumps or large piece of sod. Allow to sit for several days--until grass has rooted again.
- Now tilt both pans to an angle of 30 degrees. Pour equal amounts of water on both pans at the same speed.

Discussion:
- What do you see happening?
- Does one pan lose more soil than the other?

Suggested Monitoring Procedures

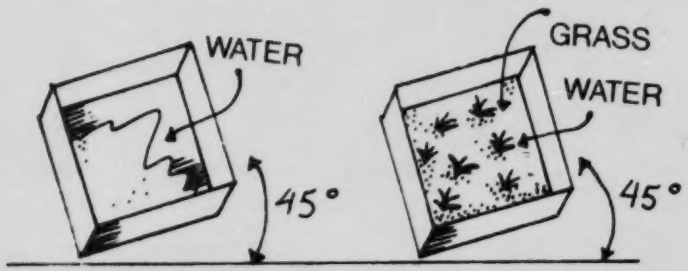
Following teacher explanation of experiment, have students predict what will happen and verify their predictions.

Give students a set of three or four pictures of hills or cliffs (with and without plant protection). Have students predict what would happen during a week-long heavy rain deluge.

Possible Resources

TB: Erosion: Leveling the Land, Britannica Jr.
TB: Once There Was A Tree, Phyllis S. Bush, Scholastic Book Services

District Resources

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
. If we don't wish to lose our soil during a rainstorm, what must we do? . How is grass an important interdependent part of our earth?  		District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows the place an organism lives is called its "habitat." B. The student is able to describe the function of an organism's habitat, e.g., provides shelter, food, conditions for reproduction.

State Goal 1
District Goal
Program Goal 3

Related Area(s) Social Studies, Art

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Animal Habitats Group Size: small group or individual Materials: pictures of animals in their natural habitat Procedure(s): . Display one picture at a time (or distribute pictures to individual students or small groups). . For each animal find out: a. Where it lives (habitat). b. What it eats. c. What preys on it. d. How it has its young (eggs, live births). e. Type of shelter. Title: Build an Artificial Habitat Group Size: entire class or small group Materials: see "Resources" Procedure(s): . Plan, build and stock an artificial habitat to maintain in the classroom, such as an aquarium, terrarium, and/or cage. They may be stocked with fish, snails, reptiles, ants, gerbils, mice, guinea pigs, mealworms, etc. Discussion: . What kind of habitat does this animal require? . What must this habitat include?	Have students invent an animal and its habitat. This may be done in story or picture form. Have students make a collage of an animal and its habitat. Question the student about why certain things were included.	TB: Science Activities for Elementary Children, Nelson, Wm. C. Brown Co., 1976 TB: Animal Homes, Saern Mayer, Platt and Munk Publishers TR: Eggs and Tadpoles, Elementar Science Study, McGraw-Hill Book Co. TR: Workjobs for Parents, Mary Baratta-Lorton, Addison Wesley Pub. Co., pp. 64-65 TR: The Great Perpetual Learning Machine, Jim Blake and Barbara Ernst, Little, Brown and Co., pp. 46-49, p. 62 TR: Project Learning Tree, American Forest Institute, Inc., Available from SPI, "Trees As Habitats," pp.114-116 F: Water Planet, Doubleday, 197 F: Animals & Their Homes, Coronet F: Fresh Water Pond, Britannica F: Seashore Life, Britannica S: Rainforests of the Northwest Coast, U. of Wash., 1969 Fs: When Animals Migrate, Film Strip of Month Club

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows change in the organism to meet changing environmental conditions is called "adaptation." B. The student is able to identify examples of adaptation in our environment, e.g., different color, different beak forms, different forms of locomotion, different diets, different leaf forms, different root patterns. C. The student values change and adaptation as necessary to the survival within an environment.

State Goal	2,4,5
District Goal	
Program Goal	3,4,5

Related Area(s) _____

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Bird Walk Group Size: entire class, individual Materials: pictures of birds--Starlings, mallard duck, herring gull Procedure(s): . Display pictures of the birds. Next to the pictures list questions such as: 1. Can you name these birds? 2. Which of these birds are water birds? How can you tell? 3. Look at their bills. Can you tell what kind of food they eat? . Students can use bird cards, bird charts, field guides, etc. . Variation: Use other bird samples. . See activities under: Organisms-- The student is able to identify ways in which animals protect themselves.	Have students write their answers to the questions and place them in an answer box. See section on Organisms.	Fs: Place to Live, National Audubon Soc See resources under: The student is able to identify ways in which animals protect themselves. S: Meadow Life in the Northwest Mountains, U. of Wash., 1969

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows clean air and water are essential to maintaining a he lthful environment. B. The student is able to identify the effects of air and water pollution on plants and animals in restricted environments.

State Goal	2.5
District Goal	
Program Goal	2.7

Related Area(s)

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Raindrops are Falling Group Size: entire class Materials: school area Procedure(s): . Teacher and students take a walk in the rain to observe how rain strikes the soil, sidewalk, grass and trees; how soil moves with surface water; how raindrops cling to leaves and how leaves cushion the force of raindrops, thus helping protect the soil. Discussion: . In what ways do plants, animals and people depend on and use sunshine, snow and rain? . For what purpose do we use water at school? At home? In the city? On a farm? . How is water and air affected by plants, animals, soil and people? . Do we need to take care of soil, water, plants, animals, air? Why? . What are some things you can do to make your community clearer, more healthful and more beautiful?	Teacher will accept all student responses at this time to questions suggested in the discussion section.	TB: The Alligator Book, William Bently, Walker, 1972 TB: The Clean Brook, Margaret Bartlett, Crowell, 1960 Fs: Splash A Probe Into Water For Living Things, Harcourt Brace
Title: Water Pollution Group Size: entire class or small group Materials: pictures of ponds, lakes and rivers; magazines, newspaper; library books Procedure(s): . Allow students to look through pictures of polluted and apparently unpolluted bodies of water. Discuss	Given a picture of a pond, unpolluted and supporting many forms of life, have student draw a picture of the same pond in a polluted state.	TB: Discovering Nature Series, World Pub. Co., New York TB: Good Rain, Goudey, E. A. Dutton & Co., New York, 1950 TB: True Book of Conservation, Gates, Childrens Press, Chicago, 1959 K: Creative Moments, Creative Studies Inc., "Dilution of Pollution"

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
their observation. . If there are some nearby water areas, have students visit them and report their observations. Discussion: . What do you notice about the water environment? . What are some things that affect the lives of animals in the water? . Do you know about any lakes or rivers in our area? What condition are they in? Clean? Dirty? . What would happen if we could not use our fresh waters? . If you had the authority, what would you do to clean up the fresh waters?		District Resources

SMALL SCHOOLS PROJECT

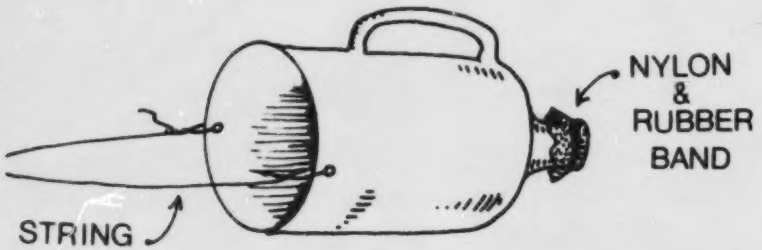
Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows clean air and water are essential to maintaining a healthful environment. B. The student is able to identify the effects of air and water pollution on plants and animals in restricted environments.

State Goal	2,5
District Goal	
Program Goal	2,7

Related Area(s)

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Investigating Pollution Group Size: class or small groups Materials: (for each group) paper, tin cans, oil, food coloring, hot plate, pan, water, big dish pan, pieces of glass Procedure(s): . Explain to students that the dish pan will represent a body of water. . Allow students to throw papers and cans in the dish pan to represent garbage people throw in lakes, streams and the ocean. Add food coloring to represent chemical waste. . Add hot water to represent heat from atomic furnaces. Discussion: . Would you like to swim in this body of water? . Do you think fish can live in this ocean? . How can we stop polluting our waters?	Have students suggest ways they can stop pollution.	
Title: Daphnia Group Size: small groups Materials: algae (in pond water), daphnia, aged tap water, gallon plastic jug, nylon stocking, sturdy rubber band, rope or string, small jars or plastic cups, small aquarium or 1 gal. mouth jar, soap, oil, herbicide, pesticide (both should be handled by the teacher and kept away from the children), fish net	Have students predict what will happen to the daphnia in polluted water and verify by experimentation.	TB: Science Projects in Pollution Seymour Simon, Holiday House F: What is Ecology, Britannica 1962 F: Water For All Living Things, Britannica, 1964 F: Conservation--A Job for Young America, McGraw-Hill, 1967 F: Your Friend the Water, Britannica, 1954

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Take students to a nearby pond to gather daphnia. The following scoop may be constructed to drag through the water:  . Put daphnia and algae water in a small container close to a light source. Discussion: . How does polluted water affect the animal life in it? . How would polluted water affect the daphnia? . How could we find out? (Allow students to plan and carry out experiments to discover the effect of adding soap or oil to a daphnia culture. . What did you observe? . How do you think polluted water affect fish? . How do you think polluted water affects human beings?		F: Life Along the Waterways, Britannica, 1952 F: The Ocean: A First Film, Film Assoc. TR: Pond Water, Elementary Science Study, McGraw-Hill Book Company
Title: The Facts Are Clear--The Air Is Not Group Size: entire class Materials: two pint jars with lids, wooden matches Procedure(s): . Cap a pint jar to represent clean air. . Take a similar jar and hold it upside down and burn three wooden matches or a candle in it. Cap it	Have students write a story or draw a picture about what will happen if we continue to pollute the air. Ask the students to suggest ways of keeping the air clean.	F: How Air Helps Us, Coronet, 1963

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows clean air and water are essential to maintaining a healthful environment. B. The student is able to identify the effects of air and water pollution on plants and animals in restricted environments.

State Goal 2.5
District Goal
Program Goal 2.7

Related Area(s) Social Studies

Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources
quickly. This can represent "dirty air." . Pass the jars around for students to observe. Discussion: . Which air would you like to breathe? Why? . What causes the air to become dirty? . What would happen if we continue to pollute our air? . How can we balance our demand for energy and products with our need for clean air? Title: How Do Business and Industry Pollute the Air? Group Size: individual Materials: pictures, books, films--about industrial pollution Procedure(s): . Describe to students the many products that are made and, during the process, some form of heating or burning takes place that emits gases into the air: a. Companies that incinerate their paper, cardboard packaging. b. Chemical companies that manufacture many products. c. Power plants that burn coal or fuel oil. d. Gasoline refineries, service stations that make or spill gasoline. e. Smelting plants. . Have students find out how many different pollutants are emitted into the air.	Ask students to fill out a worksheet which shows possible pollution problems connected with manufacturing or other business activities in their community.	F: Little Man--Big City, Center for Mass Comm. F: Overload in the Cities, Doubleday F: First Mile Up, Natl. Fm. Brd. of Canada NL: ECO-NEWS, The Environmental Action Coalition, Vol. 5, "Where Does All the Garbage Go?"

Suggested Activities: Grade(s) ___3	Suggested Monitoring Procedures	Possible Resources
Discussion: . Which is better to have--nice products or clean air? Title: What is Smog? Group Size: entire class Materials: gallon jug with lid, matches, sulphur, paper Procedure(s): . Burn some matches and drop in a jug and cover. . Burn some sulphur and drop in a jug. . Burn some paper and drop in a jug. Discussion: . How would you like to breathe this continuously? . How much of these pollutants do you think need be in the air before people are poisoned? . Have we ever had any deaths from smog? . How can we reduce the amount of smog in the air?		
Title: How do Automobiles Pollute the Air? Group Size: entire class Materials: chart paper; pictures of cars, suburbia, freeways, downtown rush hour Procedure(s): . Discuss ways automobiles destroy our environment. Make a list on chart paper or on a chalkboard: a. 75% of noise is made by automobiles. b. 80% of air pollution comes from automobiles burning gasoline and oil. . Discuss what life would be like without automobiles. Record answers under good or bad columns. Discussion: . Is the automobile worth the problems it has caused? . Would you give up the family car if necessary to "clean up" the air?	Ask students to try to identify specific elements in smog and hypothesize ways to reduce it.	District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows clean air and water are essential to maintaining a healthful environment. B. The student knows there are many job opportunities in science.

State Goal	2,5
District Goal	
Program Goal	2,7

Related Area(s) Career Education, Art, Social Studies

Suggested Activities: Grade(s) 3

Title: Science Careers
Group Size: entire class
Materials: resource people

Procedure(s):

- Students talk about their main interest in science.
- Teacher lists careers related to students' interest, e.g., dinosaur--paleontologists; weather--meteorologists; volcanoes--volcanologists.
- Student chooses science career of interest and writes why he/she chose it.
- Variations: Have students identify good health practices.
- Discuss people who help keep us healthy, e.g., health inspector, sanitation worker, nutritionist, etc.
- Choose one health-care habit and workers involved and make a cartoon strip story with captions.

Suggested Monitoring Procedures

Have student share stories written about students' career interests.

Have students make a cartoon strip showing one health-care habit and workers involved.

Possible Resources

TB: What Does A Veterinarian Do? Compton Grant
TB: I Know A Weatherman, Barbara Williams
TB: Animal Doctors, What Do They Do? Leonard Kessler
TB: Eric Plant A Garden, Jean Hudlow
TB: The True Book of Weather Experiments, Illa Joaf Poden
TB: Science at Work: Project In Oceanography, Seymour Simon
TB: The Aquanaut, Arthur Schaffert
TB: I Want to be a Forester, Eugene Baker
TB: You Can Work in the Health Service, Betty Warner Dietz
F: Exercise for Happy Living, Health, You and Your Helpers
F: What Ecologists Do, Centron Ed. Films
F: How a Scientist Works, Britannica, 1960
Fs: My Dad, The Veterinarian, What Does Your Dad Do? Series, Scott Education Div.
TR: Project Learning Tree, American Forest Institute, Inc., Available from SPI, "Classroom Conservation," pp. 46-47

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Pollution of the Neighborhood Group Size: entire class Materials: Procedure(s): . Take a walk around the neighborhood and look for signs of pollution. . List types of pollution, e.g., water, air, litter, and how it affects our health. . Invite a speaker to explain his/her role in pollution control. . Make posters stressing pollution and its control. . Have students look for newspaper articles on pollution.	Have students make a chart showing one or more types of pollution found in their community.	
Title: Noise Pollution Group Size: entire class Materials: Procedure(s): . Have students sit quietly and listen for different sounds. . Discuss the noise level in the class and when you feel most comfortable. What are your feelings when the noise level is high? . Discuss work areas and related occupations where the noise level is high, e.g., airport, lumber mill, train, rock concert. . Discuss devices used by workers to protect ears from noise pollution. . Make a collage of things which contribute to noise pollution.	Have students identify collage pictures showing two or more different things which contribute to noise pollution and how they can be corrected.	District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows non-living things obtained from the earth are composed of minerals. B. The student knows rocks are composed of minerals. C. The student is able to identify several common minerals, e.g., quartz, feldspar, mica. D. The student is able to identify several common rocks, e.g., granite, basalt, limestone, shale.

State Goal 4

District Goal

Program Goal 4

Related Area(s)

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Soil--Composition Group Size: entire class or small groups Materials: jar, water, gravel, sand, garden loam, local subsoil (obtained by the students) Procedure(s): . Partly fill a jar with water and add a half-cup each of gravel, sand, garden loam and local subsoil. . Cover the jar and shake it thoroughly and then allow the soil to settle. . Identify the rocks and sand (non-living materials) that have settled at the bottom of the jar, or, . On white paper or toweling, have students separate and examine earth from around the school.		TR: Practical Guide to Second Grade Activities, "Do All Things Settle At the Same Rate?" Milliken Publishing Company, p. 111 TR: Science in Elementary Education, Peter C. Gega, John Wiley & Sons, p. 254 TR: The Great Perpetual Learning Machine, Jim Blake and Barbara Evans, Little, Brown and Company, pp. 71-72 F: The Earth-Resources in its Crust. Coronet, 1960 F: Rocks in Our Neighborhood, McGraw-Hill, 1961 F: Igneous Rocks, Modern Learning Aids, 1965 F: Understanding Our Earth-Rock and Minerals, Coronet, 1957 F: Understanding Our Earth-Soil Coronet, 1953 F: Minerals Challenge, Bureau of Mines, 1970 F: Our Earth, Central Scientifi Company F: Rocks in Our Neighborhood, McGraw-Hill F: Rocks: Where They Come From Coronet Fs: Rocks, Minerals, & Fossils, Eye Gate House
Title: Rocks and Minerals Group Size: entire class or small groups Materials: film demonstrating common rocks and their mineral composition; reference books on rocks; charts and pictures of rocks; samples--granite, basalt, limestone, shale; egg carton Procedure(s): . Show films and/or slides. . Granite rock is speckled with grains of the different minerals of which it is composed. Three typical minerals found in granite are quartz, feldspar and mica. . Make a display matching and labeling, a sample of each of these minerals with a sample of granite.	Given teacher-supplied samples (quartz, feldspar, mica, granite, basalt, limestone, shale), have students identify correct name for each sample.	

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources

- Encourage students to make a small rock collection, labeled and displayed in a cigar box or egg carton. With a hand glass, examine sand particles, salt, quartz and feldspar crystals.
- Using a classified telephone book, list local industries depending primarily or secondarily on earth materials. Visit some for samples to display. Visit a local quarry or builders' supply store.

Discussion:

- What is soil?
- What are rocks?
- What kinds of rocks are there?
- How do rocks differ?
- Why do we need to know anything about rocks?

OT: Earth Sciences-Earth Materials- Rocks & Minerals K & E

S: Rocks and Minerals, Scientific

TB: The Dirt Book, Eva Knox Evans, Little, Brown and Company

TB: Secrets in Stones, Rose Wyler and Gerald Ames, Scholastic Book Services

TB: The Young Experimenters' Workbook: Treasures of the Earth, Harry and Laura Lootin, W. W. Norton and Co.

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows soil is mostly composed of weathered rocks,

B. The student is able to identify several common soil forms, e.g., clay, loam, sand

State Goal	4
District Goal	
Program Goal	4

Related Area(s)

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Experimenting With Soil Group Size: entire class or small group Materials: 2 qt. jar, several handfuls of dirt, water Procedure(s): . Put the dirt into the jar. Add water (½ full). Shake water and soil thoroughly and allow to settle for a few hours longer. . The more dense materials settle to the bottom and the less dense materials form in layers above. Discussion: . What happened? Why? What things can you see in the jar? How does this process activity occur in our environment?	Have students identify the material found in the different layers.	TB: Elementary School Science & How to Teach It, Blough & Schwartz TB: What Is Soil, John B. Syrocki, Benefic Press, 1961 TB: A Handful of Soil, Seymour Simon, Hawthorn, 1970 TB: Soil, Richard Cromer Follett Publ. F: Understanding Our Earth: Soil, Coronet F: Soil: What It Is and Does, Coronet Fs: The Soil, Eye Gate
Title: Examining Soil Group Size: individuals, groups of 2 and 4 or Learning Center Materials: soil samples--enough for participants; paper plates or paper towels; magnifying glass Procedure(s): . Spread soil samples on paper plate. Examine the sample to see what is there. Discussion: . What is soil? . Students make list of elements that make up the soil sample.	Have students examine playground soil to determine what type it is and what elements it contains	TB: A Handful of Soil, Seymour Simon, Hawthorn Books TR: A Sourcebook for Elementary Science, Elizabeth B. Hone, Harcourt, Brace & World, pp. 124-126

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Clay, Sand or Loam? Group Size: small groups (2-6 students) Materials: soil samples of clay, sand, loam; paper plates or paper towels; magnifying glass Procedure(s): . Spread soil samples onto separate plates. Examine each sample to see what can be found in sample. Discussion: . What is the difference between the three samples? . What do we call these three types of soil (sand should be given readily, clay and loam might need to be supplied by teacher).	Observation of students identifying soil samples in clay, sand and loam.	
Title: Weathering Rocks Group Size: small group Materials: heavy jar, gravel Procedure(s): . Place limestone gravel in jar and tighten lid. . Each day have students take turns shaking the jar. . Note: In a surprisingly short time the gravel will begin to break down. The students will see soil being produced. Discussion: . What's happening to the rocks? Why? . What other ways does nature use to turn rocks into soil? . What role does the sun play in turning rocks into soil?	Have students observe the jar and state what is happening.	District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student is able to demonstrate how they can conserve and enjoy their environment. B. The student knows there are many job opportunities in science.

State Goal	2,5,8
District Goal	
Program Goal	5,6,7

Related Area(s) Social Studies

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Keeping Our Environment Healthy Creates Jobs Group Size: entire class Materials: resource people Procedure(s): . Bring in a resource person whose job relates to the environmental sciences. . Variations: Take a field trip to a lake, beach or park. . Discuss pollution (air, water, land) and each individual's responsibility in controlling it. . Define and discuss energy, natural resources, waste, conservation, litter. . Develop art projects, e.g., murals, booklets, posters, about the environment. . Go on a litter pick-up around the school and weigh the amount of litter collected.	Have students name some jobs found in environmental science. Have students define some of these terms: environment, conservation, pollution, natural resources, litter. Notice whether students voluntarily pick up litter and are conscious of the need to protect and preserve our environment.	TB: What is Air, Gene Darley, Benefic Press TB: Animals of the Seashore, Bertha Parker, Row TB: What is Water, Hagamon, Benefic Press, 1971 TB: What is Soil, Syrocki, Benefic Press, 1971 S: The Seashore, J. W. Thompson S: Science for Beginners-Pictures That Teach, Silver Burdett F: A Thousand Suns, Gilbert Film Assoc. F: Toast, Oregon State Energy Office

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SUBJECT: Science

SPECIFIC AREA: Organisms

	Page	Suggested Grade Placement	District Placement K	1	2	3	4
The student knows:							
. all things are classified as living or non-living.	127-129	K-1					
. all living things are classified as either plant or animal.		K-3					
. the gross characteristics of plants, e.g., growth, production of its own food, reproduction.	135-	K-3					
. the gross characteristics of animals, e.g., growth, uses of other organisms as food, locomotion, rapid response to stimuli, reproduction.	127-	K-3					
. organisms must reproduce in order to continue the species.	181-	2-3					
. individual organisms may die, but the species will continue if reproduction is adequate.	181-	2-3					
. organisms respond to change in their environment, e.g., wet-dry, warm-cold, light-dark.	177-	2-3					
. fossils represent examples of former plants or animals.	185	2-3					
. there are many job opportunities in science.	193-	K-3					
The student is able to:							
. classify things as living or non-living.	127-	K-1					
. classify living things as plant or animal.	131-	K-3					
. identify the main parts of certain plants as root, stem, leaf and flower.	135-	K-3					
. describe the function of the root, stem, leaf and flower.	129-	K-3					
. identify the conditions of good plant growth, e.g., light, water, air, soil.	147-	K-3					
. describe the germination of seeds, e.g., beans - (cycles).		K-3					
. describe ways in which seeds are transported.	175-	K-3					
. identify the main parts of certain animals as head, body, apparatus for locomotion, apparatus for obtaining food, eye.	153-	K-3					
. describe the function of major parts of an animal, e.g., of the insect--head, thorax, abdomen, legs, eye.	155-	K-1					
. identify the conditions for good animal growth, e.g., air, water, food, adequate temperature in the environment, shelter or protective mechanism.	161	K-3					
. describe the stages of animal development, e.g., youth, maturity, old age.	163-	2-3					
. identify ways in which animals obtain food.	167-	K-3					
. identify ways in which animals protect themselves, e.g., coloration, flight, fang, claw.	171	2-3					
. identify responses of plants and animals to changes in their environment, e.g., reduced body temperature (animal), loss of moisture (plant and animal), inability to manufacture food (plant), loss of skin pigmentation (animal), avoidance of adverse stimuli (animal).	177-	2-3					
The student values:							
. the role of plants in his/her daily life.	187	K-3					
. the role of animals in his/her daily life.	191	K-3					
. his/her behavior as an organism.		K-3					

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER _____

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-1

Student Learning Objective(s) A. The student knows that all things are classified as living or non-living. B. The student is able to classify things as living or non-living. C. The student knows the gross characteristics of animals, e.g., growth, use of other organisms as food, locomotion, rapid response to stimuli, reproduction.

State Goal	4
District Goal	
Program Goal	4

Related Area(s) Social Studies, Art

Suggested Activities: Grade(s) K-1

Title: Living--Non-living
Group Size: entire class
Materials: A living snail and a toy snail (or cat, lizard, etc.)

Procedure(s):

- Show the students the toy snail and ask what it is.
- Then show them the living snail and ask what it is.
- Now ask the students to talk about how the two are different. (One is living.)
- Ask the students if the snails are different in other ways.

Title: School Walk
Group Size: small groups (of two or three)
Materials: paper bag for each group, white glue, construction paper
Optional: terrarium, plastic shoe box or large jar

Procedure(s):

- Take students to a nearby park, empty lot or the school yard to find examples of living and non-living things.
- Return the living things to their "homes." (Or bring them back to stock the terrarium.)
- Glue the non-living things to colored construction paper to create interesting designs.

Suggested Monitoring Procedures

Have the students sort pictures into living--non-living classifications.

Possible Resources

F: Living and Non-Living Things, Coronet

Fs: The Aquarium, McGraw-Hill
Fs: What Is Alive? Britannica
Fs: World of Living Things, SVE
Fs: Living Things Are Everywhere, Popular Science

District Resources

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Building an Aquarium Group Size: small groups of six to eight Materials: (substitutions can be made from the local environment) Toy snail (fish, etc.), fish (six to ten guppies, platies or zebra fish), plants, four to eight branches of anachris, two to eight snails, water (aged for 48 hours), coarse sand (enough to make a layer 5 cm. deep in bottom), shells, marbles, coral, aquarium, plastic shoe box or large jar, jars for storing aquarium water, fish food, aquarium thermometer, filter (optional), heater (optional), small jars. Procedure(s): . Show the items collected for the aquarium to the students. The live organisms should each be in a separate container with aged water and air, covered. As you hold up each container, have students tell what they know about the item inside. . Show the students a live snail and a toy snail. Ask the students to help you sort the collection of items into two groups, each containing one of the snails. Accept any grouping. . Ask the students to name each group. . Continue grouping until the students classify the groups as "alive" and "not alive" and suggest suitable names for the two groups. . Set up the aquarium. Assign different groups of students to be responsible for the sand, water, plants, etc. . Allow students to observe the aquarium over a period of time. Ask them to describe their observations (plants grow, fish use fins to move, snails lay eggs, guppies eat each other, etc.) . Students may keep a picture or written record of their observations.	The students should be able to state in their own words that living things grow, need food and air, and reproduce. If they recognize only one characteristic of living organisms, consider that acceptable.	District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows that all living things are classified as either plant or animal. B. The student is able to classify living things as plant or animal. C. The student knows the gross characteristics of animals, e.g., growth, use of other organisms as food, locomotion, rapid response to stimuli, reproduction.

State Goal	1,4
District Goal	
Program Goal	3,4

Related Area(s)

Suggested Activities: Grade(s) K-1

Title: Plant or Animal?
Group Size: entire class
Materials: chart paper, felt pen, masking tape, five or six animals (guinea pig, guppy, mealworm, tadpole, fruit fly, or pictures of animals) Five or six plants (carrot with foliage, weed, bean plant, house plant, tree in school yard, grass)

Procedure(s):

- Each day for several days show students one plant and one animal. Write the name of each organism on one of two charts. Then invite and record the students' observations of the organisms on each chart.
- Prepare a chart headed Animal and one headed Plant.
- Display the previously compiled charts, plant charts in one group, animals in another. Ask the students to name the properties that all the animals have in common; list these on the Animal chart.
- Have the students name some ways plants differ from animals and record these observations on the Plant chart.
- Display a new animal. Compare this animal with the Animal chart and have the students discuss whether the new animal has the characteristics listed there.
- Display a new plant and repeat the exercise.
- Optional activities: Compare each new plant or animal brought to class with the chart. Use a student as an example of an animal.

Suggested Monitoring Procedures

Given a set of teacher-supplied pictures, students should be able to classify them as plant or animal.

Possible Resources

Fs: What is an Animal, Ward's Natl. Sci. Estab.

District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows all living things are classified as either plant or animal. B. The student is able to classify living things as plant or animal. C. The student knows that the place an organism lives is called its habitat.

State Goal	1,4
District Goal	
Program Goal	3,4

Related Area(s) See "Environment"

Suggested Activities: Grade(s) 2-3

Title: Brine Shrimp & Clover
Group Size: small groups
Materials: small clean (do not wash with soap) jars with lids--four for each group; magnifiers (optional) for each group; masking tape--for labels; brine shrimp eggs; one package of clover seeds; coarse non-iodized salt; gallon jars (2-4) or 4-8 half gallon jars, etc.

Procedure(s):

- At least two days before you begin the activity, wash two large jars (do not use soap) and fill them with tap water. After the water is aged, prepare the salt solution as follows:
  a. Add salt to half of the aged water at the rate of 2 tablespoons of salt to 1 quart of water.
  b. Stir until the salt crystals have dissolved.
  c. Label the containers, either "salt water" or "fresh water."
- Put the brine shrimp and clover seeds in unmarked containers.
- Distribute eggs and seeds to students but do not identify which are eggs and which are seeds. Allow students to observe them with magnifiers (optional).
- Students may wish to name the eggs and seeds to distinguish between them--e.g., "bigs" and "littles."
- Point out to students the fresh water and salt water and ask them to suggest experiments to determine in which kind of water each lives. A suitable experiment is diagrammed on the following page.

Suggested Monitoring Procedures

Give students a list of organisms and have them classify them as either plant or animal.

Have students supply examples of habitats for a class bulletin board.

Possible Resources

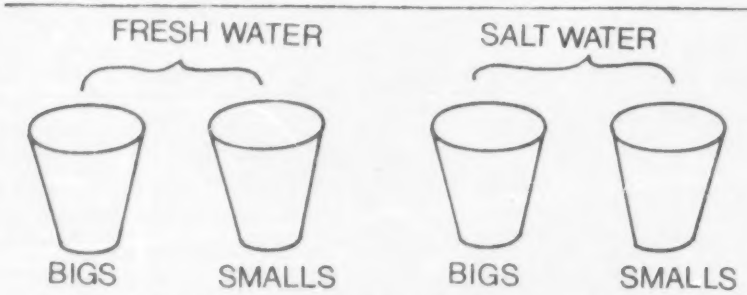
Fs: Home of Birds, SVE
Fs: Why Animals Live Where They Live: Squirrels, Eye Gate
Fs: Nest, Den & Hive, Ed. Reading Service

F: Animal Habitats, Film Associates

TB: Pandas Live Here, Eberle, Irmengarde, Doubleday, 1973

District Resources

Suggested Activities: Grade(s) 2-3



- Label each jar to identify the group of students, type of water, and "bigs" or "littles."
- During another class period, allow students to observe their seeds and eggs. The "littles" are now tiny orange shrimp and the "bigs" are green plant-like objects.
- Review the concepts of plant and animal. Record students' observations under the headings "bigs" and "littles." Ask students which list describes an animal and write the heading above that list. Ask them to label the other list (plant).
- Ask students to describe the differences between plants and animals. Tell them that the animals are shrimp and the plants are clover.
- Develop the concept of habitat. Draw the accompanying diagram on the chalkboard.

	Clover	Brine Shrimp
fresh water		
salt water		

- Ask how many groups had clover growing in fresh water and write that number in the clover/fresh water section. Do the same for each section.
- Draw two columns on the board. Ask students to use the data on the board to decide where clover and brine shrimp grow. Record their answers:

{ Shrimp / Salt Water
{ Clover / Fresh Water

Suggested Monitoring Procedures

Possible Resources

District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows all living things are classified as either plant or animal. B. The student is able to classify living things as plant or animal. C. The student knows that the place an organism lives is called its habitat.

State Goal	1,4
District Goal	
Program Goal	3,4

Related Area(s) See "Environment"

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
. Label the shrimp-clover column "Organism" and the type of water "habitat." Explain to students that a place an organism lives is called a "habitat." . Ask students to name other animals and their habitats. List these in the appropriate column.		District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of plants, e.g., growth, production of its own food, reproduction. B. The student is able to identify the main parts of certain plants as root, stem, leaf and flower. C. The student is able to describe the function of the root, stem, leaf and flower.

State Goal	1,4
District Goal	
Program Goal	3,4

Related Area(s) Health and Nutrition

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Plant Parts Group Size: entire class Materials: pictures of plants, live plants and sets of parts, overhead projector Procedure(s): . Introduce students to new words: root, stem, leaf, flower. Show them plant parts, using overhead projector. . Have students work in small groups with live plants and pictures to become familiar with naming the main parts of plants. . Give groups different examples of plant parts and ask them to classify the sets according to main plant parts. Discussion: . Why are the roots necessary to the plant? . Does a tree have the same parts? . Will all plants have the same parts?	Have students identify plant parts provided from actual plants or pictures.	TB: A First Look at Leaves, Millicent Selsam and Joyce Hunt, Walker, 1972 TB: Who Goes There in My Garden? Ethel Collier, W. R. Scott, 1963 TB: The Great Perpetual Learning Machine, Jim Blake and Barbara Ernst, Little, Brown and Co., pp. 58-61 TB: A First Look at Leaves, Harriet Springer, Scholastic Book Services TB: What is a Flower? Jenifer Day, Golden Press TR: A Sourcebook for Elementary Science, Elizabeth B. Hone, Harcourt, Brace and World
Title: Plant Parts Group Size: small group Materials: vegetables; cabbage, lettuce, spinach, asparagus, celery, carrots, radishes, sweet potatoes, tomato, peppers, cucumbers, squash	Have students match each vegetable with printed labels of the parts. Probe student responses for further depth of understanding of the discussion questions.	F: Tree on the Road to Turntown, McGraw-Hill F: Let's Watch Plants Grow, Coronet Fs: Development of Plants, Jam Handy

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Bring in vegetables. Have students identify which plant part it is: leaves (cabbage, lettuce, spinach); stems (asparagus, celery, white potato); roots (carrots, radishes, sweet potatoes); seed (flower part) (tomato, peppers, cucumbers, squash). Discussion: . Can you think of other fruits or vegetables for each main part? . Are all the plant parts important for the survival of the whole plant? Is one part better than the other parts? . Variations: Have students draw a plant and label the major parts. Have students match the part name with the specific part. Have students bring examples of plant parts from home for a classroom display.		TB: The Green Grass Grows All Around Us, H. Hoffman, Macmillan, 1968 TB: Cindy's Snowdrops, Doris Orgel, Knopf, 1966 Fs: Finding Out About Green Plants, SV Fs: How Plants Live, Britannica Fs: New Plants From Older Plants, Jam Handy Fs: Learning About Plants, Britannica
Title: Discovering Flower Sequence Group Size: small Materials: live examples of flowers, fruits, seeds or picture cards of flowers, fruits and seeds Procedure(s): . Have students arrange sequentially with flower, fruit and seed. . Have them arrange sequentially and make sure all three stages are from the same plant. Discussion: . What is the purpose of the flower? . What is the purpose of the fruit? . Can we arrange them in any other order?	From live samples or picture cards of flowers, fruits and seeds, have students arrange them in sequential order and explain why they were placed in that order.	District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of plants, e.g., growth, production of its own food, reproduction. B. The student is able to identify the main parts of certain plants as root, stem, leaf and flower. C. The student is able to describe the function of the root, stem, leaf and flower.

State Goal 1,4

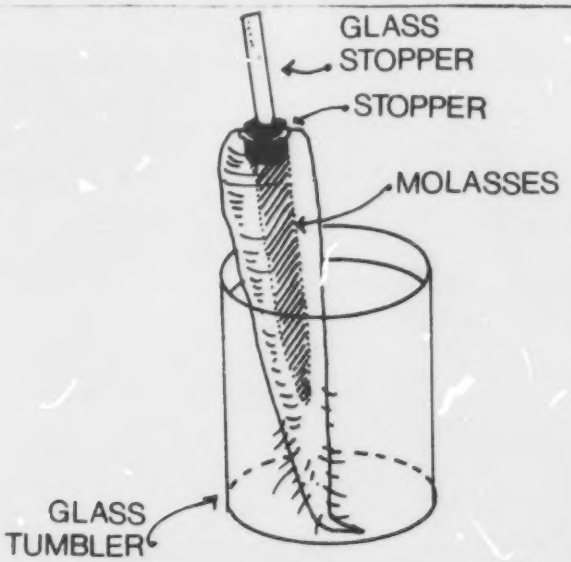
District Goal

Program Goal 3,4

Related Area(s) Art

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Do Roots Seek Water? Group Size: small group Materials: medium-sized plant box, 2" flower pot, adhesive tape, soil, beans Procedure(s): . Close drainage hole in the pot tightly (use oil base clay or adhesive tape). . Place pot close to one corner of the box and fill box with soil. . Plant a number of seeds close to the sides, working them down with a finger. Plant other seeds at various distances in the soil. . Fill flowerpot with water. Do not put any water directly on the soil. The only source of water the plants have is that which comes through the flowerpot. . Keep daily record of observations. . Dig up carefully and observe how roots cling to clay pot. Discussion: . Explain why roots surround clay sewer pipes. . Do all seeds under the same conditions germinate at the same time? . Why do some seeds produce longer roots?	In response to discussion questions, student should state that roots seek water.	Fs: Parts of a Plant, Britannica Fs: Plants We Use, Britannica Fs: Meet the Plant Family, Britannica Fs: Plants at School, Natl. Audubon Society
Title: How Do Roots Absorb Water? Group Size: small group Materials: glass, molasses or syrup, carrot, glass tube, one-hole rubber stopper, knife (apple corer), wax (paraffin)	Have students hypothesize why liquid rises in the tube	F: Roots of Plants, Britannica FL: Early Dev. of the Root System, Ealing Corp.

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources



Procedure(s):

- Remove top of carrot, then, with apple corer, cut hole down from the top about 3/4 of its length and about one-half its diameter (to fit the one-holed stopper).
- Fill the hole with syrup or molasses (to take up the part of the food stored in the root) and carefully insert a long glass tube through a one-holed stopper (see diagram).
- Carefully seal the rubber stopper into the carrot by using melted wax around the edges.
- Then insert the carrot into a glass of water with the water covering about 3/4 of the carrot.
- Observe the roots daily.

Discussion:

- Do our bodies absorb water?
- Would other liquids have the same kind of action? How could you find out?
- What would happen if the top of the capillary tube was sealed?

District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of plants, e.g., growth, production of its own food, reproduction. B. The student is able to identify the main parts of certain plants as root, stem, leaf and flower. C. The student is able to describe the function of the root, stem, leaf and flower.

State Goal	1,4
District Goal	
Program Goal	3,4

Related Area(s) Art

Suggested Activities: Grade(s) 2-3

Title: What are Stems For?
Group Size: small group
Materials: carrots, celery, flowers, calla lilies, white carnations, eye-dropper or drinking straw, water, daisies, colored ink or food coloring, tall glass or bottle, knife

Suggested Monitoring Procedures

Have students predict and verify what will happen if the experiment is carried out with daisies or carnations.

Make a list of student suggestions. Compare the predictions with observations made during experiments.

Possible Resources

TB: Plants With Seeds, Dorothy Wood, Follet, 1962

TR: Practical Guide to First Grade Activities, "Water Moves In Plant Stems," Milliken Publishing Co., p. 105

TR: Science in Elementary Education, Peter C. Gega, John Wiley & Sons, p. 206

District Resources

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Color water with ink or food coloring. . Stand first carrot, celery or flower in solution for one hour. Then remove and make crosscuts to show streaks. . Leave some calla lilies, carnations or daisies in colored liquid for several hours and note results. . Variations: Have two glasses--one with colored solution and the other with clear water. Take one celery stalk that has leaves and split it ½ way up from base. Place one-half of stem in colored solution and the other half in clear solution. Let sit for one hour and record results. Discussion: . What would happen if the stalk were split into two parts and each part were dipped in water? . What function do you think stems and stalks have other than carrying water? . What happens to plants during the dry seasons? In summertime? . What would happen if the stem were cut?		
Title: What Do Leaves Do? Group Size: entire class Materials: plant, vaseline Procedure(s): . Suggested activities to help the students understand the function of leaves: Cover leaves of a plant, top and bottom, with vaseline (see Plants Need Air). Cover leaves with black or dark construction paper (see Plants Need Light).		District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of plants, e.g., growth, production of its own food, reproduction. B. The student is able to identify the main parts of certain plants as root, stem, leaf and flower. C. The student is able to describe the function of the root, stem, leaf and flower.

State Goal	1,4
District Goal	
Program Goal	3,4

Related Area(s) Art

Suggested Activities: Grade(s) K-3	Suggested Monitoring Procedures	Possible Resources
Title: Artistic Things to do With Leaves Group Size: entire class Materials: white or colored paper 9x12, old toothbrush, scissors, blade, large leaf with a distinctive outside edge, poster paint with consistency of thick cream, pins to fasten leaf points, newspaper Procedure(s): . Place construction paper on newspaper padding and put leaf on construction paper. . Pin leaf points to keep from moving. . Dip toothbrush in paint and remove excess paint or it will cause blotting. . Stand away from leaf and rub scissor blade or thumbnail against the bristles away from the leaf so paint will splatter back. Spray cover the entire surface. . Remove the leaf. Title: Leaf Design Group Size: entire class Materials: small aluminum foil pan, leaf smaller than inside of pan, heavy hairpin or blunt nail Procedure(s): . Place leaf on inside surface of foil pan and, with heavy hairpin, trace carefully around the outline of the leaf. . Remove leaf and put veins in.	Have students make a leaf print.	TB: The True Book of Plant Experiments, Illa Poderdorf, Children's Press, 1960 TB: My Garden Grows, Aldren Watson, Viking, 1962 TB: Green is for Growing Winifred and Cecil Lubell, Rand McNally, 1964 TB: Growing, Marie Neurath, Sterling, 1963 TB: Plants, Willard H. Jacobson, Celia J. Lawley and Richard Konicek, American Book Co., 1968 TR: Project Learning Tree, American Forest Institute (available from S.P.I.), "Leaf Prints," p. 30 F: Learning About Leaves, Coronet Fs: Whys of Elementary Society Plants, Film Heritage

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Printers Ink Impression Group Size: entire class Materials: leaf, construction paper, printers ink or water color Procedure(s): . Cover leaf with light coat of ink or paint. . Place leaf on paper, cover with another paper and press firmly or roll with roller. . Variation: Make a collage of leaves. Title: What is the Function of the Flower? (Spring activity) Group Size: small groups Materials: large flowers, magnifying glass, small flowers Procedure(s): . Provide a large and small flower to each pair of students and have them examine the whole flower. . Ask: "How are they alike? How are they different?" . Have students take the flowers apart and ask them how many different parts they can find. Discussion: . What is the function of the flower other than looking pretty? . Why does the flower have different parts? Title: Seeds from Flowers (Spring activity) Group Size: small group Materials: flowers in various stages of development, scissors Procedure(s): . Each group should have several examples of flowers at various stages. . Cut through base of the flower to reveal the seeds developing. Discussion: . What is the function of the flower? . What happens when the flower petals drop off? What is left?		F: Apples, Britannica F: How Does Your Garden Grow? Baily Film Assoc. F: Growth of Seeds, Britannica District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of plants, e.g., growth, production of its own food, reproduction. B. The student is able to identify the main parts of certain plants as root, stem, leaf and flower. C. The student is able to describe the function of the root, stem, leaf and flower.

State Goal	1,4
District Goal	
Program Goal	3,4

Related Area(s) Art, Math

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Flowers Produce Fruits and Seeds Group Size: small group Materials: tomato, orange, apple, cherry, squash, cucumber, pumpkin, knife Procedure(s): . Give several types of fruits to each group and have students cut them open to discover what is inside. . Count the number of seeds in each fruit. Discussion: . What appears first, the fruit or the flower? . What is inside the fruit? . What is the function of the fruit?	Have students state the function of the flower, fruit and seed in plant growth.	F: Seeds Grow into Plants, Coronet F: From Seeds to Plants, Gateway Fs: Fruits (curriculum) FL: Seeds Contain Tiny Plants, Eye Gate House TR: Science in Elementary Education, Peter C. Gega, John Wiley & Sons, p. 200
Title: Tumbler Garden Group Size: individual or small group Materials: drinking glass or baby food jar, seeds (lima or mung bean), paper towels, water, magic marker, labels, cotton Procedure(s): . Wash bottles and dry them. . Roll paper towel into a cylinder and place it in the tumbler so it hugs the walls. . Stuff cotton or crumpled paper towel inside the cylinder to force the paper up against the walls. The cotton will retain moisture for the seeds and plants. . Insert the seeds between the cylinder and the side of the glass.	Teacher will observe student behavior in caring for his/her plant--watering, placing near light source, etc. Students will keep a record of procedures used in caring for their plants.	F: Learning About Plants, Britannica F: Plant Life, A Series, Britannica Fs: Plants at School, Natl. Audubon Society TB: What is a Fruit? Jenifer Day, Golden Press TB: How A Seed Grows, Helen Jordan, Thomas Y. Crowell Co. TR: Practical Guide to Third Grade Activities, "Seed Collecting," Milliken Publishing Co., pp. 126-127

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
. Water the cotton, but not so much that you see water. Discussion: . What is the best location for the seed? . Where should we place the tumbler for good growth? . Label each plant part. . What things should we keep in mind for good plant growth? . Variations: Have students take a walk around the school to observe plant parts--likes and differences. Go to a greenhouse. See how plants are grown, cared for and started. Dig up dandelions, clover, and other plants to investigate root systems. Look at different flowers to see how they are different and how they are alike. Experiment with ways to grow plants other than from seeds, e.g., avocado seed, potato, coleus leaf, stem cutting.		TB: Growing Plants from Fruits and Vegetables, Jane Sholinsky, Scholastic Book Services District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of plants, e.g., growth, production of its own food, reproduction. B. The student is able to describe the ways in which seeds are transported.

State Goal	1,4
District Goal	
Program Goal	2,3

Related Area(s)

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: How Do Seeds Travel? Group Size: small groups Materials: different types of wild seeds (wild bird seed mix), paper, printed materials about seeds Procedure(s): . Visit a garden to observe the growth of new seeds. . Ask students to gather information concerning seed travel. . Have students bring in different types of seeds. . Ask students to observe seeds as they travel by air, water, animals and people. Have them make charts of their findings. Discussion: . How does seed travel help maintain a plant species? . Can you name some seeds man eats? . Can you name some seeds that animals eat? Title: Traveling Seeds Group Size: small groups, individuals Materials: various seeds, pots, soil Procedure(s): . Have students bring in samples of seeds that travel. . Have students discuss ways the seed is transported. . Have students try to grow plants from their seeds. Some seeds will sprout and grow easily. Others will need special treatment. . What things protect the seeds? . What would happen if no seeds traveled? . Discuss shapes of seeds and other characteristics which might help them travel. . Discuss weather conditions and other ways that aid in seed travel.	Have students make a chart including seeds which travel by air, water, animals and people.	F: Birds That Eat, International Film Bureau F: Seed Travelers, Gateway Fs: Travelling Seeds: A Probe Into Adaptation, Harcourt Brace TB: A Tree Is Something Wonderful, Elizabeth and Padraic Cooper, Golden Press TB: Who Goes There in My Garden? Ethel Collier, Scott TB: Seeds By Wind and Water, Helene Jordon, Crowell TR: Practical Guide to First Grade Activities, "Seed Dispersal," Milliken Publishing Company, p. 110

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Seed Dispersal Group Size: small group Materials: bag of dried beans or peas; balsa wood and/or construction paper, tape, paste or glue, rubber bands, toothpicks, red tempera, scissors, pencil, plastic bag, piece of cork, cotton and/or feathers, small metal springs, balloons Procedure(s): . Tell the students that some seeds can grow where they fall and that some seeds are dispersed. . Give each student a bean seed to be dispersed by the students. . The students are to modify the seed to float on water at least five minutes. (air bubble, raft) . Modify the seed pod with a mechanism that will throw the seed two feet away from the parent plant. . Modify the seed to attract a bird or other animals (bright, tasty fruits with seeds inside) . Modify the seed to hitchhike on an animal or man for 20 feet. . Provide the group with materials for modifying the seeds. Allow time for construction of adaptations. . When everyone is done, call on students to demonstrate their modifications. Discussion: . Can you find plants that have features like the modifications? . What might happen if such seed dispersal mechanisms didn't exist?	Observe students as they adapt seeds for dispersal.	FL: Seed Dispersal, Int. Comm. Fms. District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of plants, e.g., growth, production of its own food, reproduction. B. The student is able to identify the conditions of good plant growth, e.g., light, water, air, soil.

State Goal	1,4
District Goal	
Program Goal	2,3,4

Related Area(s)

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: What Do Plants Need? Group Size: small groups Materials: three plants of the same kind and size, a large cardboard box, paper, marker, tape Procedure(s): . Have students place two plants near a light source. Students are to water only one of these plants. Students cover the third plant with the box. It should be watered, but should not receive light. . Label the plants with the marker and tape appropriately. . Allow several days for the experiment. Discussion: . Which plant did best? Why? . What do you think is important for good plant growth? . What can we do for the other two plants?	Students should indicate that plants need water and light based on the experiment.	F: What Plants Need for Growth, Encyclopedia Britannica Corp., Chicago, IL TR: Exploring Science Program, Laidlaw Publishing Co. TB: Watch Out For My Plant, Barr TB: Plants Grow, Thomas E. Tinsle: Random House TB: The Carrot Seed, Ruth Krause, Random House TB: Timothy's Flower, Jean Van Leeuwen, Random House K: Science Activity Cards For Fun, Jody Murdock & Pat Wright, Frank Schaffer Publications, Inc. 26616 Indian Peak Rd., Palos Verdes Peninsula, Ca
Title: Do Plants Need Soil? Group Size: individuals Materials: paper cups, soil, stones, bean seeds Procedure(s): . Have each student plant bean seeds in soil and some in rocks or stones. . Discuss and observe growth at the end of one, two and three weeks. Discussion: . Which kind of planting material would you use to plant a garden? . What things are important to remember when planting a seed?	In response to discussion questions, students should state that a seed needs soil to grow and why.	

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Plants Change Group Size: small groups Materials: picture cards of various stages of plant growth Procedure(s): . Have groups work together to arrange cards in correct sequential order. . Discuss changes in plants as they mature. . Report findings and ideas to class. . See also, Seeds From Flowers, p. 142 Discussion: . Are there other things that change as they mature? Discuss. . Why is change necessary?	From a set of teacher-supplied cards showing stages of plant growth, have students arrange in proper sequence.	Discovering Plants, Glenn O. Blough District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of plants, e.g., growth, production of its own food, reproduction. B. The student is able to identify the conditions of good plant growth, e.g., light, water, air, soil.

State Goal	1,4
District Goal	
Program Goal	2,3,4

Related Area(s)

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Do Plants Need Light? Group Size: small group Materials: two pots filled with soil, bean seeds, paper bag (geraniums serve well for this experiment) Procedure(s): . Soak bean seeds overnight to speed germination. . Have students plant seeds and allow plants to come through soil. . Keep one pot in direct sunlight. Cover the other pot with a paper bag. . Observe for several weeks, removing bag for observation period only. . Have students record progress of experiment. Discussion: . What would happen if the bag were switched in the middle of the test period? . What would happen if a heavy, clear cellophane were placed over one plant instead of the paper bag? . Is there any difference during the first few days when both plants break through the soil?	In response to discussion questions, students should state that light is beneficial to plant growth.	F: Tree on the Road to Turntown, McGraw-Hill, 1963 F: From Seeds to Plants, Gateway F: Planting Our Garden, Encyclopedia Britannica F: What Do Plants Do, BFA F: Let's Watch Plants Grow, Coronet Fs: How Green Plants Grow, Jam Handy Fs: What Do Green Plants Need for Growth, Jam Handy Fs: Where Green Plants Grow, Jam Handy Fs: How Plants Live, Encyclopedia Britannica TB: Tia Maria's Garden, Ann Nolan Clark, Viking Press TB: A Tree Is A Plant, Clyde Bulla, Crowell
Title: Do Plants Need Air? Group Size: entire class Materials: two pots filled with soil, bean seeds, petroleum jelly Procedure(s): . Soak bean seeds overnight to speed germination. . Plant seeds and place in sunshine. . Coat leaves of one plant with petroleum jelly. . Have students record results of week-long experiment. Report to class.	In response to the discussion questions, students should state that plants need air.	K: Creative Moments, Creative Studies, Inc., "How Do Seeds Grow?"

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Discussion: . Why did one plant die? . What have we learned about the needs of plants? . What would happen if only the topside were coated? Only the bottom side? . What would happen if only half the leaf were covered? Title: Do Plants Need Sunshine? Group Size: entire class Materials: black construction paper, paper clips, growing plants with large leaves. Procedure(s): . Cut out a pattern on one side of a folded piece of black construction paper. Discussion: . What would happen if we covered all the leaves? . What happens to the plant leaf after the paper is removed? Observe for several days. . What do plants need to grow? 	In response to the questions, students should state that plants need light to grow.	District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of plants, e.g., growth, production of its own food, reproduction. B. The student is able to identify the conditions of good plant growth, e.g., light, water, air, soil.

State Goal	1,4
District Goal	
Program Goal	2,3,4

Related Area(s)

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: In What Kind of Soil Do Plants Grow Best? Group Size: small group Materials: radish seeds, three flower pots, sand, clay, loam Procedure(s): . Divide class into three groups. . One group will plant five radish seeds in sandy soil, another group will plant five seeds in clay soil, and the third group will plant five seeds in loam. . Water each pot with the same amount of water and keep all other conditions the same. . Let class keep a record of results. Discussion: . From student observations, discuss which type of soil was best. . Would a mixture of soils be better than any one type? How could you find out? . How would knowing the best type of soil be beneficial to farmers?	Students should state that one type of soil is best for plant growth.	TR: Science Activities for Elementary Children, Leslie Nelson and George Lorbeer Fs: Plant Needs, Encyclopedia Britannica
Title: Plants Change Group Size: entire class Materials: lima bean seeds, five half-gallon size milk cartons, good soil, water, paper towels, spatula Procedure(s): . Wash cartons. Cut four cartons to the height of 4" and the other carton to one inch. . Put soil in the 4" cartons. . Put several beans in carton 1, labeling planting date.	Observe the students' behavior as they care for their plants.	District Resources

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
. Repeat with cartons 2, 3, and 4, planting one carton in successive weeks. . Place cartons in light, sunny spot, and keep soil damp. . One week after the last planting, put several seeds in the 1" carton. . Add a small amount of water to sprout the seeds. . When plants have reached desired level of growth, uproot them carefully. Wash soil from roots. . Place one plant from each stage of growth on a paper towel for each group of students to examine, compare and discuss. Discussion: . How fast do bean plants grow? . Do they grow faster during the first week, second week, third week, or fourth week? . Do all plants grow at the same speed? . What changes have occurred since the seed was planted?	Ask students to construct a bar graph (histograph), showing the different rate of growth for each stage.	District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of animals, e.g., growth, uses of other organisms as food, locomotion, rapid response to stimuli, reproduction.
B. The student is able to identify the main parts of certain animals as head, body, apparatus for locomotion, apparatus for obtaining food, eye.

State Goal	2,4
District Goal	
Program Goal	3,4

Related Area(s)

Suggested Activities: Grade(s) K-1

Title: Animal Study
Group Size: entire class
Materials: Select two or three animals from those that may be available to you e.g., fish, chameleons, salamanders, snakes, frogs, turtles, mice, hamsters, gerbils, ant (in ant farm), earthworms, aquatic snails, fruit flies (raised on a mixture of cooked cream of wheat and yeast in a pint jar), brine shrimp eggs (in salt water solution), meal worms - hand lenses may be required for some observations.

Procedure(s):
- Have students observe and identify parts of the animals, comparing similarities and differences.
- Have each student select one animal for a special study. The student is to draw the animal and identify its main parts.
- Mount the pictures in a scrapbook.
- The students may share their reports in a guessing game, "What Animal Am I?"

Suggested Monitoring Procedures

Students should be able to identify examples of body parts that are different and identify examples of body parts that are similar when shown pictures of animals.

Ask each student to begin an animal scrapbook. Add pictures from magazines and student drawings.

Possible Resources

F: Animals Are Different and Alike, Coronet
F: Ants, Britannica
F: Nature's Strangest Creatures, Walt Disney

District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

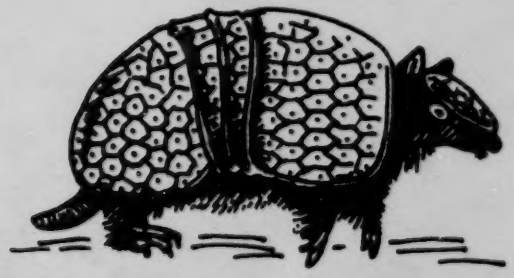
Student Learning Objective(s) A. The student knows the gross characteristics of animals, e.g., growth, uses of other organisms as food, locomotion, rapid response to stimuli, reproduction.
B. The student is able to describe the function of major parts of animals, e.g., insects--head, thorax, abdomen, legs, eyes.

State Goal	1,2,4
District Goal	
Program Goal	2,3,4

Related Area(s)

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Animals Have Different Kinds of Specialized Mouth Parts Group Size: entire class Materials: pictures of a variety of animal mouths, live animals as available Procedure(s): . Have students observe and describe the mouth parts of different kinds of animals. . Have students compare the different mouth parts of different kinds of animals. . Classify mouth parts according to function. . Predict the function of certain mouth parts. Discussion: . Ask questions such as the following: How are the teeth of a horse different from the teeth of a tiger? . Why do some birds have a long narrow beak, while others have short beaks?	Given teacher supplied pictures, the students will classify mouth parts according to function. Probe student responses to discussion questions.	TR: A Sourcebook for Elementary Science, Elizabeth Hone et al, Harcourt, Brace & World, p. 43 F: Animals That Fly, Bailey Fm. Assoc. FL: How Land Animals Move, Internatl. Com. Fms. FL: How Living Things Move, Warren Schloat Prod.
Title: What Parts Can Animals Use For Flight? Group Size: entire class Materials: pictures of animals that fly, a live bird Procedure(s): . Students collect pictures of animals that fly or glide to make a collage, or scrapbook, or bulletin board. . Observe and describe different kinds of appendages that enable different kinds of animals to move through the air.	From cards of animal parts, students indicate the parts which enable animals to fly.	District Resources

Suggested Activities: Grade(s) 1-2	Suggested Monitoring Procedures	Possible Resources
. Compare the different appendages that enable different kinds of animals to move through air. Discussion: . What animals can fly or glide through the air? . Which of these animals have wings? . If the other animals do not have wings, how do they fly? . Do animals with wings fly? . Discuss the difference of wings and appendages that are not wings, such as the bat's modified foot structure. Title: Pet Fair Group Size: entire class Materials: poster paper, area large enough to hold a pet fair Procedure(s): . Set up a pet fair. . Students make posters for each animal in the fair. The posters should describe the parts of the animals and the function of those parts. Functions should include protection, movement, food getting.	Observe students as they describe or illustrate the functions of several body parts of their animal on their poster.	
Title: The World's Most Successful Animal Group Size: entire class Materials: duplicated picture of the World's Most Successful Animal, large unlined paper, crayons, paint or pencils.		District Resources



ARMADILLO

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of animals, e.g., growth, uses of other organisms as food, locomotion, rapid response to stimuli, reproduction.
B. The student is able to describe the function of major parts of animals, e.g., insects--head, thorax, abdomen, legs, eyes.

State Goal	2,4
District Goal	
Program Goal	3,4

Related Area(s)

Suggested Activities: Grade(s) 1-2	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Introduce the activity by having students identify and describe the adaptive structures of the animal. Adaptations are for particular environments. As students suggest successful adaptations, ask them to identify the appropriate environment. . Have each student draw his/her own idea of the world's most successful animal. . Have the student label each part of the drawing, telling how each part would help the animal to be successful.		District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of animals, e.g., growth, uses of other organisms as food, locomotion, rapid response to stimuli, reproduction.
B. The student is able to describe the function of major parts of animals, e.g., insects--head, thorax, abdomen, legs, eyes.

State Goal	1,2,4
District Goal	
Program Goal	2,3,4

Related Area(s)

Suggested Activities: Grade(s) 1-2	Suggested Monitoring Procedures	Possible Resources
Title: What Are Some Parts of Animals? Group Size: entire class Materials: pictures of snakes, spiders, insects, dogs, other animals Procedure(s): . Have students study the pictures. . Ask questions as follows: What body parts does a snake have? How does it move without legs? What body parts does a spider have? How many legs does it have? How does a spider get food? What parts does a dog's paw have that a human hand does not have? What can a human being do with his/her hand that a dog cannot do with its paw? What are some parts of animals you have observed? How do they compare with parts of other animals? What can some animals do that others cannot? Why? Title: Animals Have Different Kinds of Covering Group Size: entire class or small groups Materials: aquarium or jar with fish, woodland terrarium with amphibians, desert terrarium with lizard or horned toad (students may bring pets from home or borrow animals from other classes) use picture if live animals are not available.	Observe students' responses.	F: How Animals Eat, University of Idaho F: How Animals Move, University of Idaho TR: Probe, Mary M. Roy, Educational Services, Inc. TB: The Great Perpetual Learning Machine, Jim Blake and Barbara Ernst, Little, Brown and Co., pp. 41-55 TB: Phuzzles, Mindteasing Photo Puzzles, Carole Harper, Golden Press District Resources

Suggested Activities: Grade(s) 1-2	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Have students observe and describe the covering of the different kinds of animals. . Compare wet and dry, smooth and rough, slippery and furry coverings. . Have students classify animals on the basis of their outer coverings. Discussion: . How does an animal's body covering help it? . Discuss what kind of environment each animal lives in	Students should be able to classify animals on the basis of their outer coverings when given teacher-prepared cards.	
Title: Animals Have Different Kinds of Appendages Group Size: entire class Materials: pictures of a variety of animals showing leg structure, a live cat, other live animals as available. Procedure(s): . Have students observe and describe different kinds of animals with different kinds of legs. . Have students compare the leg structure of different kinds of animals. . Have students classify animals on the basis of their leg structure. Discussion: . Discuss the leg structure of different kinds of animals. . How do they help the animals? . Look at the legs of a cat: How many parts are there? . Are there joints as in your legs? . How many joints? . Look at a cat's paw. What do you see on the underside of the paw? . Not all animals have legs. Name some without legs. . Name some animals that have more than four legs. . Name some animals that have fewer than four legs. . Variations: students collect pictures showing leg structures. Make a collage using pictures of human and animal legs. Allow each student to observe, describe how a fish swims. A focus question might be: "How do fish move? Do they use feet?"	Have students classify animals on the basis of their leg structure from pictures.	F: Animals Move in Many Ways, Film Association of California F: Animals--Ways They Move, Encyclopedia Britannica F: How Do They Move, Britannica District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of animals, e.g., growth, uses of other organisms for food, locomotion, rapid response to stimuli, reproduction.
B. The student is able to identify the conditions for good animal growth, e.g., air, water, food, adequate temperature in the environment, shelter or protective mechanism.

State Goal	2,4
District Goal	
Program Goal	2,4

Related Area(s)

Suggested Activities: Grade(s) 1-2	Suggested Monitoring Procedures	Possible Resources
*See activities on identifying main parts of animals. p. 153- Include discussion questions: What do the animals eat? What temperature is best for them? Do the animals live on land or water? Describe the environment the animals live in. *See activities on how animals obtain food. p. 167- *See activities under identifying changes in animals due to maturation and/or need for protection. p. 171		Fs: Finding Out How Animals Live, S.V.E. Fs: How Animals Live, Eye Gate Fs: Pets, S.V.E. F: The Turtle--Care of a Pet, BFA F: Wander In Your Own Back Yard, Churchill TB: Workjobs for Parents, Mary Baratta-Lorton, Addison-Wesley, p. 64 K: Science Activity Cards for Fun, Jody Murdock & Pat Wright, Frank Schaffer Publications, Inc., 26616 Indian Peak Rd., Palos Verdes Peninsula, Ca.

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of animals, e.g., growth, uses of other organisms as food, locomotion, rapid response to stimuli, reproduction.

State Goal 1,2,4

District Goal

B. The student is able to describe the stages of animal development, e.g., youth, maturity, old age.

Program Goal 1,2,4

Related Area(s)

Suggested Activities: Grade(s) K-1

Title: Life Cycles
Group Size: entire class
Materials: adult animals and their young (at least one live example) pictures of above

Procedure(s):

- Display the animal and its young to the students.
- Show pictures of adult and young animals.
- Students are to describe and compare several characteristics of adult and young, e.g., shape, size, texture, color, symmetry, means of locomotion.
- Students can match pictures of adult animals with pictures of young animals, or draw pictures.

Title: Field Trip
Group Size: entire class, in pairs
Materials: paper and plastic bags (to hold items collected on trip), old spoons, trowels or other digging tools, hand lenses, live animals and parts of animals collected on trip.

Procedure(s):

- Take students on a field trip to look for animals and vestiges of animals at different stages of their life cycles.
- Before the hunt, ask students why it is important to replace any log or rock they turn over. Ask why they should return all organisms to the place they were found.
- As partners find something of interest, they show it to other groups of partners, describing in detail where they found it.

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Suggested Monitoring Procedures

From pictures, have the students match young animals with adults.

Determine from class discussion if students can predict the adult animal from different stages of its development.

Possible Resources

TR: Butterflies, ESS, McGraw-Hill

District Resources

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Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Discussion: . Bring students together. Ask if there are any relationships among the items they observed. Do young animals always look like older animals of the same kind? What have you found that will show this? Did you observe something that shows us that animals change? Title: Two Poems Group Size: entire class Materials: copies of the following poems Procedure(s): . Have the students learn the following poems (or just recite them together) All Living Things Are Born and Grow A cat will have a baby cat, never, never a baby bat! A bear will have a baby bear, never, never a baby hare. A bee will have a baby bee, never, never a baby flea. A whale will have a baby whale, never, never a baby snail. An eagle will have a baby eagle, never, never a baby beagle. A swan will have a baby swan, never, never a baby fawn. A monkey will have a baby monkey, never, never a baby donkey. A moose will have a baby moose, never, never a baby goose.		District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of animals, e.g., growth, uses of other organisms as food, locomotion, rapid response to stimuli, reproduction.

B. The student is able to describe the stages of animal develooment, e.g., youth, maturity, old age.

State Goal	1,2,4
District Goal	
Program Goal	1,2,4

Related Area(s)

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources

GROWING UP

How do I know I'm growing?
I can't wear last year's coat
It's too tight.
Last year's shoes are too small for me.
My legs are too long to ride my old tricycle.
Now I can reach the shelf for the peanut butter.
I don't have to stand on a chair anymore.
I can carry a whole bag of groceries.
I can even pick up my baby brother.
I can kick the ball farther.
I can run faster.
I can jump higher.
I can play longer.
With all these clues, I know I'm growing.
What clues tell you that you are growing?

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Suggested Activities: Grade(s) 1-2	Suggested Monitoring Procedures	Possible Resources
Title: Life Cycle Wheels Group Size: individuals, or entire class Materials: For each student: heavy paper or light cardboard (two sheets) in circular patterns, paper fasteners, pencils, scissors, crayons. For class: child's encyclopedia nature magazines. Procedure(s): . Discuss the meaning of life cycle. . Have students select an organism with a life cycle having three to four stages. . Students draw one stage of an organism's life cycle on each wedge of one circle. . Cut one wedge from the second circle, taking care not to cut all the way to the center. . Cover the illustrated circle with the second circle. . Use paper fasteners to attach the circles together at the center. Discussion: . Pair the students and have them exchange wheels. Have students take turns describing the stages of the life cycle for the other student to locate. Each description should include several characteristics of one stage of the life cycle.	Observe the students as they describe the stages of the life cycle.	TB: Animal Families, Ann Weil Children's Press, 1956 TB: When Animals Are Babies, Elizabeth Schwartz, Holiday, 1964 TB: The Guinea Pig That Went to School, Follett, 1968 TR: Science Activities for the Elementary Grades, B. John Syrocki, Parker Pub. Co. TR: Eggs and Tadpoles, Elementary Science Study, McGraw-Hill Publishing Co. F: Animal Babies That Grow Up, Coronet F: Life Cycle of the Monarch, Ken Middleham Prod. Fs: Finding Out How Animal Babies Grow, S.V.E. Fs: Growing Up--A Probe Into Likenesses, Harcourt, Brace Fs: Life Cycle of Insects, Britannica Fs: Animal Babies, S.V.E. FL: Life-Cycle of the Ant, Film Assoc.

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of animals, e.g., growth, uses of other organisms as food, locomotion, rapid response to stimuli, reproduction.

B. The student is able to identify ways in which animals obtain food.

State Goal	1,2,4
District Goal	
Program Goal	2,3,4

Related Area(s)

Suggested Activities: Grade(s) K-1

Title: What Are The Gross Characteristics of Animals?
Group Size: entire class
Materials: none needed

Procedure(s):

- Ask the students to name some animals they know.
- Ask students to brainstorm some characteristics of these animals (fur, hair, eat meat, etc.)
- Group the responses of students and put under large headings: Food, Locomotion, Reproduction

Title: A Silk Trap
Group Size: entire class
Materials: terrarium, screen cover, jars and covers, net

Procedure(s):

- Take a field trip to look for a spider.
- Put the captured spider in a jar.
- Make a home for the spider (terrarium). Cover with a screen.
- While spider is making its web, take a net to catch flying insects.
- Empty the net into the terrarium and cover quickly.
- If you have a female spider, you may be able to see it spin a silk case and fasten it to the side of the terrarium. The spider lays eggs in the cup, makes a cover for it and dies.

Suggested Monitoring Procedures

Have the students fill in the matrix of gross characteristics (horizontal) and the names of some animals (vertical).

Example:

	FOOD	Locomotion Parts + Function	Reproduction	Young
Dog	meat	legs walks	live	puppy
Bird	seeds	legs wings walks flies	egg	bird
Fish	plants bugs	fins swims	live + egg	fry
Frog	bugs	legs hops swims	egg	tadpole

Have the students make a class bulletin board display from class drawings of animals catching their food.

Possible Resources

F: Animals See in Many Ways, BFA

TB: Charlotte's Web, E. B. White

TB: Tarantula: The Giant Spider, Gladys Conclin, Holiday House

TB: My Daddy Longlegs, Judy Hawks, Crowell

TB: Who Goes There in My Garden, Ethel Collier, W. K. Scott

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Discussion: . Discuss the different stages of the web the spider spins. . Discuss how the spider gets its food, and what it eats. What would happen if a dead fly were put in the terrarium? Would the spider eat him? . How do the baby spiders get out of the silk case? Title: How Animals Get Their Food Group Size: entire class (Learning Center activity for 1st and 2nd graders) Materials: aquarium, soil, twigs, moss, fine screen, fruit flies, chameleon, tree frog Procedure(s): . Set up a terrarium (using an aquarium if available). . Include twigs, moss, anything else to make it look like a woodland area. Cover terrarium with fine screen. . Place a chameleon and a tree frog in the terrarium. . Place a bottle of fruit flies in the terrarium. . Have students observe and comment on the way the frog and chameleon obtain their food. . Have students draw pictures of animals getting flies Discussion: . How does your tongue differ from a frog's tongue? . Try to make your tongue curl. . Why can't you catch flies with your tongue? . How else does the frog's tongue help him? . Discuss the way the animals move: the way they use their legs for moving toward and assisting in capturing the flies. . Ask the students if they believe the animals can be seen easily by the flies. . Generalize to other animals' methods of obtaining food. . Variations: Set up a feeding tray near a window to observe bird feeding habits. Have students with pets make a list of the foods their pets eat. Have them trace each food to its origin--	Have students find pictures which illustrate how animals get their food. Have students group animals together according to manner animals obtain their food. Observe students in discussion of How Animals Get Their Food.	TR: Science for the Elementary School, Macmillan, 1965, p. 511 (Part IV), p. 526 (Part II) p. 528 (Part III) TR: Today's Basic Science (Book 1), pp. 68-69 TR: Looking at Science (Book 2), Lyons, pp. 72-75 TB: Science for Work and Play (Book 1) pp. 118, 120, 122-123, 130-131 TB: Science for You (Book 1) Singer pp. 42-46, 150-151 TB: Why Frogs Are Wet, Judy Hawks, Crowell, 1968 F: Animals, Ways They Eat, Encyclopedia Britannica F: Animals and Their Foods, Coronet F: How Animals Eat, McGraw-Hill FL: How Spiders Capture Prey. Ealing Corp.

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows the gross characteristics of animals, e.g., growth, uses of other organisms as food, locomotion, rapid response to stimuli, reproduction.

B. The student is able to identify ways in which animals obtain food.

State Goal	1,2,4
District Goal	
Program Goal	2,3,4

Related Area(s)

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
(dog food--beef, horses which eat plants; cat food--fish, which eat smaller fish, which eat plants; birds--eat seeds of plants). . Students could bring the labels from pet food cans to identify the contents. . Take a field trip to a local ant hill. Take some sugar, a cookie, or candy. Put the sweet stuff near the ant hill. Observe the ants' behavior in obtaining the food. . Build and observe an ant colony.		

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student is able to identify changes in animals due to maturation and/or need for protection. B. The student is able to identify ways in which animals protect themselves, e.g., coloration, flight, fang, claw.

State Goal	1,2,4
District Goal	
Program Goal	1,2,4

Related Area(s)

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Why Are Animals The Color They Are? Group Size: entire class Materials: chameleon, mealworms, frog (Rana), one green tree frog (Hyla), guppies, box (shoe box or other small box), animal pictures from magazines collected by students, picture of animal's habitat, construction paper of various colors. Procedure(s): . Introduce by showing pictures of various animals. . Discuss differences in color and surroundings. . Place all animals around the room and ask students to look at the animals and notice their colors. . Have them describe similarities and differences in color between animals. Ask: "What color are they? Why do you think they are that color?" . Place the chameleon in another box which is lined with dark green construction paper or cloth. Leave animal in box until it becomes green. . Have students observe and describe animal, its color, shape and movement, etc. . Repeat, using a box lined with brown paper or cloth and ask students for theories as to why the animals changed color. . Have students cut out colored pictures of animals from magazines such as National Geographic, Look, Life and Nature Magazines. Have them place the	Observe students as they place animals in appropriate habitats and their reasons for their choices.	TB: Science is Fun, (Book 1), Foresman Scott, pp. 62-63 (coloration) TB: Science for Work & Play, (Book 1), Heath, (habitat) pp. 117-119, 121, 123-124, 129 TB: Science for You, (Book 1), Singer, p. 41 TB: Exploring Science, (Book 2), Allyn, pp. 156-158 TB: Hidden Animals, Millicent Selsam, Harper-Row, 1969 TB: Animals and Their Colors, Michael and Patricia Fogden, Crown Publishers & Co. TR: Science for the Elementary School, (Part III), Edwards, Victor, p. 528 F: Adaptation in Animals, McGraw-Hill F: Adaptation of Insects, Stanton F: Adapting to Changes in Nature, Journal Films Fs: Adaptation in Animals, Budek

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
cut-out on various colors of paper. Ask them to find a color in which they can see the cut-out animal clearly, and a color on which the cut-out is more difficult to see. Do this with several animals. . Ask for observations and comments: "What type of habitat do you think these animals live in? What type of plants would be around? What would happen if this animal (a light-colored animal) was placed in a light habitat?" . Ask students to bring in colored pictures from magazines which show the habitat of animals. . Have students place the cut-out animals from the previous exercise in the habitats in which they believe the animals belong. Ask for explanations and reasons for placing the animals.		Fs: Adaptation of Birds, Jam Handy Fs: Why Do Animals Hide, BFA Ed. Media
Title: Guppies Respond to Stimulus Group Size: entire class Materials: aquarium or glass bowl, guppies, paper clip on a string, flashlight, fish food	Have students predict what will happen if the experiment is repeated with goldfish.	
Procedure(s): . Place guppies in aquarium and ask students what response fish will give if a paper clip on a string is lowered near their tails. . Ask students to suggest additional stimuli, such as flashing light, food, etc., and have them predict the possible responses the fish might make. . Have students test their theories by experimenting with the fish and stimuli. . Have several small groups of students work with one fish per group. . (Tapping on the glass is harmful to the fish.) . Feed guppies in one spot for several days. Watch what happens when you walk up to the tank. . Change guppies to another spot for several days. What happened? Variation: Mealworms - observe their response to water, light, noxious liquids, e.g., vinegar		District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student is able to identify changes in animals due to maturation and/or need for protection. B. The student is able to identify ways in which animals protect themselves, e.g., coloration, flight, fang, claw.

State Goal	1,2,4
District Goal	
Program Goal	1,2,4

Related Area(s)

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Invent an Animal Group Size: small group Materials: potatoes, string beans, carrots, white latex paint, popsicle sticks, cotton, glue, toothpicks, plasticene or clay, tempera paint, paint brushes, masking tape, colored cellophane Procedure(s): . Paint vegetables with white latex paint. This will make them conspicuous in almost any natural habitat and camouflaging them will be a definite challenge. . Select two or more different sites as habitats for the "animals." The sites should be far enough apart so participants at one site cannot see where "animals" are located at another site. . Introduce the challenge: "Make an 'animal' from your white-colored vegetable that blends into, or is hidden by, the natural surroundings." . The vegetable is used as the main body-part of the animal. Emphasize that first each participant should choose a particular habitat (grassy, leafy, etc.) and then use the habitat as the basis for inventing the animal. Both color and shape should be considered. . Divide the group into two or more teams and send each team to a separate site. After choosing a particular habitat in the outdoor site, each participant constructs an animal to place in that spot. . When all have finished, have the teams exchange	Students will successfully adapt their invented animals to it's environment.	K: Outdoor Biology Instructional Strategies, available from Lawrence Hall of Science, University of California, Berkeley "Invent-An-Animal" District Resources

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
sites and search for the camouflaged "animals." . Bring the recovered animals together for display. Those not found are more successfully camouflaged. Ask inventors of the un-discovered animals to point out their well-camouflaged creation to the hunters. Discussion: . Why were some animals found and some not? . In what other habitats would your animal be well-camouflaged? . Name some animals you know are protected by camouflage. Describe some you have seen. . Name some animals that are not protected by camouflage. How do they protect themselves from predators? . Variations: Not all animals have the same quality of vision. Some, with limited color vision, view the world in varying shades of a single tone. . Provide colored cellophane (red is effective), Have the group "hide and search" for some of the model animals again looking through the cellophane. . Compare results of the two different searches. Title: Attention Group Size: individual Materials: materials for coloring--color crayons, tempera paint, felt-tipped pens, etc.; paper (small pieces of drawing paper); string or wire to hang or attach designs to tape.	Have students describe and draw an animal which they believe would be perfectly adapted to life on the moon and/or at the bottom of the ocean and have them give reasons for their ideas.	K: Outdoor Biology Instructional Strategies, Lawrence Hall of Science, University of California, Berkeley, "Attention" District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student is able to identify changes in animals due to maturation and/or need for protection. B. The student is able to identify ways in which animals protect themselves, e.g., coloration, flight, fang, claw.

State Goal	1,2,4
District Goal	
Program Goal	1,2,4

Related Area(s) _____

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Discuss why it might be beneficial for some animals or plants to attract attention. Have each student fill out card: Name_____ Your favorite color is _____ Pick one of these patterns: _____checked _____spots _____stripes _____diamonds _____rectangles _____triangles Choose a habitat: _____grassy _____leafy _____rocky _____other . Place filled-in cards in a hat and have each student draw one (students do not take their own and students do not tell whose card they have). . Have students make a design using the favorite color and pattern from the card that will attract the attention in the habitat indicated on the card. Each student should use the pattern and color listed and pick one other color of his own choice. . Everyone should make his design as outstanding as possible and when finished hang it somewhere in the habitat. . When everyone has finished, each student should try to find the design made for him/her. . After all have found their designs, have group decide whose creation has the most attention-attracting characteristics.		TR: Animals and Their Colors, Michael and Patricia Fogden, Crown Publishers, Inc. District Resources

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
* . Find a real plant or animal that attracted your attention by: smell _____ sound _____ sight _____ . Do the features that caught your attention warn or attract? Discussion: . Ask students if there are certain designs that attract attention in more than one habitat. . What would happen if a defenseless fly had the design and color of a bee? . What would happen if all organisms were attracted to the same designs? . What kinds of sensory displays do humans use to attract attention? . Discuss how plants must attract animals for pollination and seed dispersal. . Discuss how animals must attract members of their own kind for mating purposes and to warn others of danger. . Discuss how some organisms attract the attention of their potential enemies. . These organisms are usually distasteful, either because they give off smelly or bitter secretions or because they have powerful stings.	In response to the starred activity, students will describe by writing or drawing the real plants or animals which attracted their attention. Ask the students to collect pictures of animals that use coloration for either attracting other animals or for protection.	District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows organisms respond to change in their environment, e.g., wet-dry, warm-cold, light-dark. B. The student is able to identify responses of plants and animals to changes in their environment, e.g., reduced body temperature (animal), loss of moisture (plant and animal), inability to manufacture food (plant), loss of skin pigmentation (animal), avoidance of adverse stimuli (animal).

State Goal	1,2,4
District Goal	
Program Goal	2,5

Related Area(s) Art, Reading

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Plants and Animals Change to Survive in Winter (Mural) Group Size: small groups Materials: films: Winter Story of Survival, Birds in Winter, Seasonal Changes in Trees; butcher paper Procedure(s): . Have individuals and committees prepare various portions of a mural to show a winter scene that will provide a framework for learning how animals and plants adapt to seasonal changes. . Much observation and reading will be necessary to prepare the mural. . The basic outline for the mural should be a collage of some local scenic feature--a familiar tree now with bare limb, ice covered pond with snow (may show cross section of the pond with fish beneath the ice). . The mural should be kept factual and realistic. . Whenever issues arise they should be considered by the class and more evidence should be gathered if necessary. Title: Effect of Temperatures on an Animal Which Can Survive Great Variations Group Size: entire class Materials: fruit flies, container of water-ice	Students will contribute an example of plant and/or animal adaptation to winter for the mural.	F: Animals in Spring F: Animals in Summer F: Creatures of the Desert F: Camouflage in Nature Through Pattern Matching F: Camouflage in Nature Through Form and Color Matching F: Winter-Story of Survival F: Birds in Winter F: How Man Adapts to his Physical Environment F: Seasonal Changes in Trees F: Industrial Melonation of the Moth F: Farm Family in Autumn, ESD 104 F: Animals Live in Winter, Coronet TR: Science in Elementary Education, Peter C. Gega, John Wiley & Sons, p. 214

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Place fruit flies in a bottle or glass container and place the container in ice water for some time. . As temperature within bottle drops, the activity of the insects decreases. . Take it out of ice water and place where it will be warmed slowly. As body temperature rises, the flies will resume normal activity. Discussion: . What behavior can we observe in the fruit flies at room temperature? . What did you observe in the behavior after the bottle was placed in ice water? . What did you observe when you removed fruit flies from ice water? . How could we find out how different temperatures affect other small animals? . Variations: Use goldfish--observe behavior change, especially breathing and swimming.	Have students describe the effects of hot and cold temperatures on the fruit flies.	F: How the Leopard Got His Spots F: Animal Behavior: Winter F: Animal Behavior: Summer F: Animal Behavior: Fall F: Animal Behavior: Spring International Film Bur., 1973 Fs: How Animals Defend Themselves, 10 min. b&w $2.00 Univ. of Idaho Fs: How Animals Live in Winter, b&w $2.00 Univ. of Idaho
Title: Effects of Temperature on Plants Group Size: entire class Materials: three terrariums made from six plastic cups, tape, soil, grass seeds Procedure(s): . Place soil and grass seeds in three plastic cups. Water. Place plastic cup one on top of each other and tape together to germinate. . Place one terrarium in freezer, one in refrigerator and leave one at room temperature. . Observe differences of growth of each terrarium. . Variation: Effects of light and touch on a Nerve Plant.	On a worksheet list three habitats and have students list plants adapted to each habitat.	District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows organisms respond to change in their environment, e.g., wet-dry, warm-cold, light-dark. B. The student is able to identify responses of plants and animals to changes in their environment, e.g., reduced body temperature (animal), loss of moisture (plant and animal), inability to manufacture food (plant), loss of skin pigmentation (animal), avoidance of adverse stimuli (animal).

State Goal	1,2,4
District Goal	
Program Goal	2,5

Related Area(s) Art, Reading

Suggested Activities: Grade(s) 2-3

Title: Invent a Plant
Group Size: individual
Materials: liquid plastic film such as Fantasy Film, Fun Film, Farm-A-Film, etc. (or cellophane, plasticene or any materials for constructing models of plants); roll of floral tape; scissors; wire (thin aluminum works well); small styrofoam carton; base to support wire frame while plastic is drying (above materials can be obtained from craft or hobby shops)

. Variation: This activity could be changed to drawing, painting or cut and paste.

Procedure(s):

. Take a field trip to a nearby field to observe plants in the area.
. After returning from trip, have each student invent a plant:
  which is lawn-mower proof,
  that can live on the surface of a pond,
  that can withstand high winds,
  grazing animals would not eat,
  invent a plant that can hold onto rocks in swift rivers and streams,
  to catch insects,
  adapted to store water,
  that can compete with other plants for sunlight.

Suggested Monitoring Procedures

Have students invent at least one plant as outlined in the activities. Students should convince their peers that it will work.

Possible Resources

K: Outdoor Biology Instructional Strategies, Lawrence Hall of Science, University of California, "Invent-A-Plant"

District Resources

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
. When all students have finished, gather them together and have them make inferences about the probable habitat and unique features of each plant. Discussion: . Decide where each plant would be best suited to survive. . How would each plant be unsuited for different habitats? . How are plants adapted to seasonal changes?	Observe how well the students were able to infer the habitat for each of the invented plants.	District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows organisms must reproduce in order to continue the species. B. The student knows individual organisms may die, but the species will continue if reproduction is adequate.

State Goal	1,4
District Goal	
Program Goal	1,2,4

Related Area(s)

Suggested Activities: Grade(s) 2-3

Title: Population Walk
Group Size: entire class or small group
Materials: pencil & paper for each student, park, school yard, or empty lot

Procedure(s):
- Explore a designated area. Have students list organisms they discover, where each organism was observed, and the approximate number of examples of each organism (size of population).

Discussion: (responses may be recorded)
- What organism did you discover?
- Where did you observe it?
- Why do you think it was there?
- What is the size of that population?
- Variations:
  Visit a zoo (farm, park). Keep a record of zoo populations.
  Make a record of classroom populations.

Title: Sowbug Populations
Group Size: small groups
Materials: sowbugs or mealworms may be found in damp places under rocks, lumber, etc.; 1 or 2 quart jars or plastic shoe boxes or other transparent containers--one for each group; dry leaves, pieces of wood, oatmeal

Suggested Monitoring Procedures

Have students identify three populations around the school.

In response to questions about sowbug population, students should state that populations have to reproduce in order to survive.

Possible Resources

TR: Science for Children, Hubler, Random House, 1974, pp. 414-415, 567-568
TR: Behavior of Mealworms, ESS, McGraw-Hill
TR: Guppies, Bubbles & Vibrating Objects, John McGavack, Jr., and Donald P. LaSalle, John Day Co.

F: Population Ecology, Britannica, 1963
F: The Woods and Things, Churchill

District Resources

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources

Procedure(s):

- Obtain a small population of sowbugs. Students may be able to bring some from home or obtain them on a field trip.
- Each group sets up a colony of sowbugs. Place a layer of old leaves and one or two pieces of wood in each container.
- Moisten the leaves, being sure to keep them moist, and add a few pieces of oatmeal. Count the sowbugs as they are added.
- Have each group record the number of sowbugs in their jar every week.

Record number of sowbugs

Week	0	1	2	3	4	5
Team 1						
Team 2						
Team 3						
Team 4						
TOTAL						

- Allow students to remove the wood and leaves once a week to count and record the number of sowbugs.

Discussion:

- After the students observe an increase in the sowbug population:
  - Did the number of sowbugs increase or decrease?
  - How did it increase?
  - Are all of the sowbugs alive?
  - What would happen if they did not reproduce?
  - Do you think the population will continue to increase, decrease or remain as it is? Why?
  - What would happen if the sowbugs keep reproducing and do not die?

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District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows organisms must reproduce in order to continue the species. B. The student knows individual organisms may die, but the species will continue if reproduction is adequate.

State Goal 1,4

District Goal

Program Goal 1,2,4

Related Area(s)

Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources
Title: How Many Group Size: individual or small group Materials: rice, checkerboard or 1-2" squared worksheet Procedure(s): . Ask students how many grains of rice would be on the last square if they started with one on the first square, doubled that on the second square, doubled those two on the third square, and so on. Have students try placing rice on the squares to determine the answer. Discussion: . How many grains of rice did you put on the second square, third, fourth, etc.? . If your sowbugs doubled every day, how many would there be in a week? In two weeks? . What would happen if the sowbugs keep reproducing and do not die?	Based on the discussion, students should predict how unlimited reproduction affects population.	
Title: Continuing Populations Group Size: entire class or small groups Materials: film (see resources), books, charts, showing evolution of the horse and/or other organisms (if available). Chart--"Changes of the Horse," reproduce for entire class.	Students should state that populations continue even though individual members die. Class makes a collage or bulletin board display showing the evolution of other animals, e.g., birds	TR: Science for the Elementary School, Victor, Macmillan, London, 1970, pp. 322-332 TR: Elementary School Science and How to Teach It, Holt, Rhinehart & Winston, 1969, pp. 388-429

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Provide students with book about fossils, dinosaurs, prehistoric life, and allow time to study them. . Show the film "Horses and Their Ancestors." . Review the film with students. Discussion: . What did you see in the film? . How does Eohippus differ from modern horse? . (Eohippus was the size of a small dog, it had four toes in the front and three in back and browsed on bushes rather than grazing on grass.) . Do we have horses now? . Why do we have horses if all of their ancestors have died?		F: How Life Continues, Britannica F: Horses and Their Ancestors, McGraw-Hill, 1963 F: Horses and How They Live, Cahill District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) The student knows that fossils represent examples of former plants or animals.

State Goal

District Goal

Program Goal 2,4,5

Related Area(s)

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Show A Film Or A Filmstrip Group Size: entire class or small group Materials: fossils, film, picture of fossils Procedure(s): . Bring in samples of fossils if possible, or pictures of fossils if the real samples are not available. . Compare and discuss.	Ask the students to speculate about the habitats of the animals represented by the fossils.	F: Our Changing Earth, Film Assoc F: Fossils: Clue to Prehistoric Times F: The Fossil Story, Shell, 1953 Fs: Discovering Fossils, 5B-5 TR: Project Learning Tree, American Forest Institute, (available from S.P.I.) "Make A Fossil," p. 28
Title: Clay Fossils Group Size: entire class or small group Materials: clay, bones (chicken wings or legs) Procedure(s): . Put some wet clay into a pan and smooth the top. Push the bones into the wet clay and then remove the bones. Discussion: . "What is left in the clay?" . Variation: Sand may be used in place of clay.	Using clay the students will demonstrate how a fossil may have been formed.	TB: The Story In the Rocker, C9 1962, Shell TB: Funny Bananas, G. McHargue TB: The Enormous Egg, B. Huwarth
Title: Dinosaur Days Group Size: entire class or individual Materials: picture of dinosaur, modeling clay Procedure(s): . Have the students name and describe several kinds of dinosaurs. . Compare the dinosaurs with present day reptiles.	Students should be able to describe the nature of dinosaurs and their habitat.	Fs: Dinosaurs, A Probe of Fossils, Harcourt, Brace & World Fs: Dinosaurs, SVE Fs: Past and Present, A Probe Into Change, Harcourt, Brace & World Fs: Up Through the Coal Age, Britannica

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
. Students demonstrate how dinosaur fossils may have been formed. . Students describe how dinosaur skeletons are reconstructed and studied from fossil remains. . Make a picture of the earth as it might have looked long, long ago. . Start a class book about dinosaurs. . Make a clay model of a dinosaur and tell what it ate and where it lived. . Visit a museum to view fossil remains. Title: Old Bones Group Size: small groups Materials: chicken or turkey leg bones, box containing sand about five centimeters (2 inches) deep, sand in another container Procedure(s): . The top of the sand in the box represents the Earth's surface. Place the chicken bones on top to represent what happened when the animal died. . Have a student cover the bones with extra sand to represent what happened as time passed. . The bones were covered by soil and water. . Dig up the bones and reconstruct them to demonstrate the job paleontologists do.		Fs: Dinosaurs: The Age of the Terrible Lizard, Britannica Fs: Fossils Are Interesting, BFA Dinosaurs And Their World, Laurence Pringle; Harcourt, 1968 District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student values the role of plants in his/her daily life.

State Goal 4.5

District Goal

Program Goal 5.7

Related Area(s) Health and Nutrition, Social Studies

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Food For Us Group Size: small groups Materials: fruits, vegetables, seeds, grains, nuts Procedure(s): . First, discuss with the class the value of plants as a food source. . Ask students to bring samples of plants used as food to class. Teacher also brings some. . Have a plant tasting party. . Have students draw or cut out pictures of different types of food plants and make a collage or bulletin board display. Discussion: . What would we eat if there were no plants? . What things would we eat if there were no plants? . Are these the same plants that people in other countries eat? How could we find out?	Have students draw a picture depicting ways plants help us. Have students collect pictures of plant foods eaten by people in other countries.	TR: Project Learning Tree, American Forest Institute, (available from S.P.I.), "Long Range - Short Range," p. 68, "The Second Little Pig," p. 48 District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student values the role of plants in his/her daily life.

State Goal	4,5
District Goal	
Program Goal	5,7

Related Area(s)

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Do Plants Give Off Oxygen? Group Size: small groups Materials: two large glass jars, a live potted plant, two candles, wood splinters, grease Procedure(s): . Place a lighted candle in an inverted jar. It will soon go out, indicating that most (but not all) of the oxygen has been chemically combined. . To further prove this, raise the jar and insert a flaming splinter. Notice that it will quickly go out. . Place a live green plant in another inverted jar. . Place a lighted candle beside the plant. . When the candle goes out, put grease around the mouth of the jar in order to keep air from seeping in. . After three or four days, quickly insert a flaming splinter to test for oxygen. Discussion: . Where does the oxygen go? . What is the difference between air and oxygen? . Do plants give off oxygen at night when there is no sunshine? . What might happen if there were no green plants?	Have two or three students write a science fiction story describing a planet without plants. Will it support life? In the discussion, the students should state that plants give off oxygen.	Fs: This Unique Bit of Life--How Trees Affect the Environment, Scott Paper Co Fs: Green Plants Are Important, Jam Handy TB: The Little Red Flower, Paul Tripp, Doubleday District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student values the role of animals in his/her daily life.

State Goal 4,5

District Goal

Program Goal 5,7

Related Area(s) Health and Nutrition

Suggested Activities: Grade(s) K-2	Suggested Monitoring Procedures	Possible Resources
Title: Animal Uses Group Size: entire class Materials: pencil, paper Procedure(s): . Have students keep a list of all the foods they eat over a period of time. . Have students classify foods as plants or animals. Discussion: . Discuss other ways animals can help us. . Students collect pictures of animals and identify how each animal helps us. Title: Cows in the News Group Size: individuals Materials: newspaper, scissors Procedure(s): . Have students brainstorm for products that depend on cows. . Students cut out pictures of products or activities we would not have if there were no cows or other animals. . Have students make a collage or bulletin board display using the pictures from the newspapers.		TB: Care of Pets, Encyclopedia Britannica TB: The Rice Bowl Pet, Fatricia Martin, Crowell TB: The Baby Elephant Day, Alice Willman, Putnam District Resources

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Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows there are many job opportunities in science.

State Goal	8
District Goal	
Program Goal	6

Related Area(s)

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Plant Jobs Group Size: entire class Materials: resource people -- landscape artist, nurseryman, floral shop Procedure(s): . Have individuals who raise plants share their work or hobby with the class. Variations: Students can collect, identify and compare seeds. Plant seeds on wet cotton and in soil to observe growth. . Visit a nursery and/or florist. . Students bring in different plants to make a plant center in class. . Grow plants under a grow light. . Plant seeds, discuss environment necessary for growing plants. . Discuss growing plants for fun. . Start a collection of house plants.	Students should display an awareness of "the world of plants" by being able to tell about, draw pictures of, and develop stories about plants and people whose jobs revolve around plants. Have students identify three people with jobs in the field of plants and tell what they do and what environment they work in.	TB: Eric Plants A Garden, J. Hudlow TB: How A Seed Grows, H. Jordan TB: Seeing What Plants Do, Joan Rahn TR: Concepts in Science, Brandywein, p. 96 F: Garden for Everyone F: From Seed to Grain, McGraw-Hill Fs: Growing Things Fs: Johnny Grows a Garden Fs: Seed Plants Fs: The American Farmer, Wheat for Bread Fs: Corn For All--The American Farmer and Our Food Supply Series, Eye Gate SFs: Science in Our Daily Bread, Long Filmslide Service

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows there are many job opportunities in science.

State Goal 8

District Goal

Program Goal 6

Related Area(s) Career Education

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Tree Growing and Care Provide Job Opportunities Group Size: entire class Materials: leaves and needles, film and filmstrip (see resources), books (see resources), resource people, seedling Procedure(s): . Bring in samples of leaves and needles from healthy forest trees. . Identify samples of leaves and needles of most common forest trees (fir, cedar, pine, hemlock, alder). . View films and filmstrip about tree growing. . Discuss conditions necessary for healthy growth of trees. . Read about people who take care of trees. . List persons whose jobs contribute to the healthy growth of forest trees. . Listen to resource person talk about his/her job. . Plant a seedling in school property. . Listen to poems about trees.	Create a mural of a forest showing various workers caring for trees; e.g., planter, fire fighter, ranger, forester, lookout, and entomologist, and label each. Student can identify three jobs related to trees and tell the environment wherein the individuals work.	TB: Lookout For The Forest, Glenn Blough TB: Forests are for People, Francis Wood TB: Planting A Tree, Nancy Turner TB: Where We Plant a Tree, Warner P. Landers F: Trees, Our Plant Giants F: A Tree is a Living Thing F: Forests and Conservation Fs: Trees Grow Fs: Olympia Rain Forest

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SUBJECT: Science

SPECIFIC AREA: Property of Matter

	Page	Suggested Grade Placement	District placement K	1	2	3	4
The student knows:							
. the names of primary colors.	199-	K-1					
. the names of primary shapes, e.g., square, circle, triangle, rectangle, diamond.	205-	K-1					
. that texture is a property of objects and substances, e.g., rough, smooth.	211-	K-1					
. that taste is a property of many substances.	215	K-1					
. that odor is a property of many substances.	217	K-1					
. that color is a property of many objects and substances.	199-	K-1					
. that weight is a property of objects.	219-	K-1					
. that size is a property of objects.	223	K-1					
. that shape is a property of many objects.	205-	1-2					
. that solids occupy space, have a definite shape, and have mass.	225	2-3					
. that liquids take the shape of their containers, occupy space and have mass.	227	2-3					
. that gases take the shape of their containers, occupy all the space in their containers and have mass.	229-	K-3					
The student is able to:							
. group objects according to color.	199-	K-1					
. group objects according to shape.	205-	K-1					
. reproduce a shape when given its name.	205-	K-1					
. group objects by weight.	219-	K-1					
. group objects according to size.	223	K-1					
. group objects by texture.	211-	K-1					
. group objects by one property.	199-	K-1					
. group objects by more than one property.	235-	K-2					
. compare properties of objects.	235-	1-3					
. identify some of the materials from which objects are made.		K-1					
. identify the properties of the same material in different forms, e.g., liquid, wood, metal.		K-1					
. demonstrate that an object's form can change while its material composition remains the same.	225+	2-3					
. demonstrate that some objects float in water and that some sink.	243-	K-2					
The student values:							
. properties as a means of identification.	237	2-3					
. the use of properties in describing objects and organisms.	237	2-3					

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER _____

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-1

Student Learning Objective(s) A. The student knows the names of the primary colors. B. The student knows that color is a property of many objects and substances. C. The student is able to group objects according to color. D. The student is able to group objects by one property.

State Goal	1,9
District Goal	
Program Goal	1,3,7

Related Area(s) Art, Reading

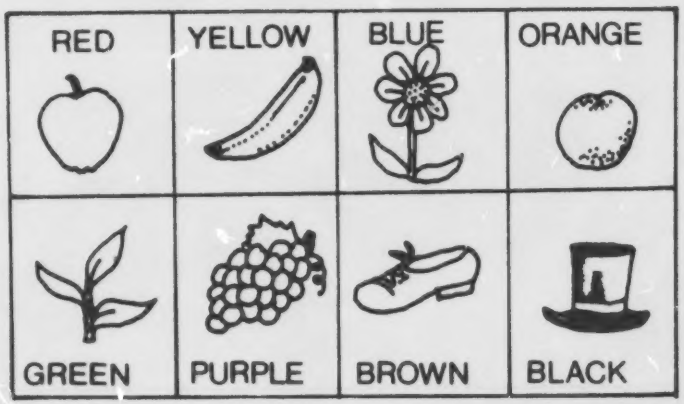
Suggested Activities: Grade(s) K-1

Title: Naming Colors With Pictures
Group Size: entire class
Materials: paper rectangles in the primary colors

Procedure(s):

. As each student arrives at school, fasten a rectangle of colored paper to student's clothing. The paper may have the student's name on it. Name the color of the paper. Ask the student to say the name of the color.

Title: Color Pictures
Group Size: entire class
Materials: pictures of various objects representing the eight basic colors (apple, banana, etc.), small worksheets for each color, crayons



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Suggested Monitoring Procedures

Possible Resources

TB: Workjobs, M. Baratta-Lorton, Addison-Wesley Pub. Co., p. 48

TR: Science--A Process Approach Ginn and Co.

TR: Beginnings, SCIS, Rand McNally

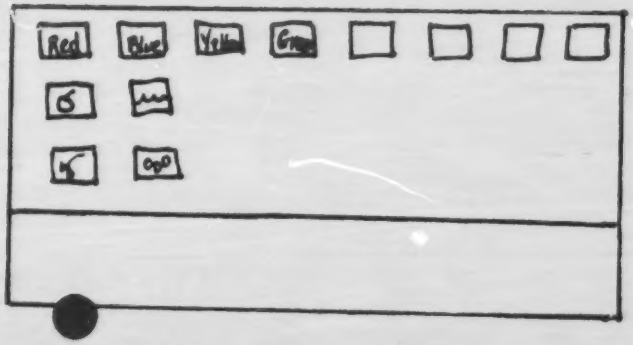
F: Colors for Beginners, Coronet

F: Colors Are Useful, Bailey

Fs: Experiments With Color, Soc. for Visual Ed.

497

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Talk about colors with the students. Have them color the whole sheet the correct color. Title: Cut and Paste Group Size: entire class Materials: worksheets using small pictures of the previously colored pictures on top to indicate color, magazines Procedure(s): . Cut colored pictures out of magazines and paste them on sheet (anything red would go on the red apple sheet). Students may do one color, both the color and paste page before going on to the rest of the colors, or the pasting activity can come afterward as a review of the colors. Title: Color Sort Group Size: small groups Materials: pocket chart, 3"x5" cards, outline pictures of objects that are usually a particular color and covered with clear contact paper, construction paper squares with eight basic colors on tagboard covered with contact paper, containers for cards and colored squares	Observe and check off when student masters activity.	District Resources



SMALL SCHOOLS PROJECT

Suggested Objective Placement K-1

Student Learning Objective(s) A. The student knows the names of primary colors. B. The student knows that color is a property of many objects and substances. C. The student is able to group objects according to color. D. The student is able to group objects by one property.

State Goal	1,9
District Goal	
Program Goal	1,3,7

Related Area(s) Art, Reading

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Put colors at top of pocket chart. Place pictures under color it would normally be. Title: Button Game Group Size: individual Materials: apple crate separator or egg carton, lots of buttons in various colors Procedure(s): . Students sort buttons into groups by color. Title: Paper Plates Group Size: individual (or entire class) Materials: squares of color paper 5x5 cm. in 8 basic colors (5 of each in box), paper plates, each marked with one of the 8 colors Procedure(s): . This activity can be done individually or as a class activity. When the class is doing it, a few come up at a time and pick a piece of paper. The student then places it on the correct plate. . In center, student places squares on plate of matching color. . Variation: Paper plate color wheel. Color pie shaped sections of a paper plate, cut a pointer from heavy paper and fasten it to the center of the plate with a fastener. Ask students to find a certain color and move the pointer to that color.	Observe and check off when student masters activity. Observe and check off when student masters activity.	TR: Workjobs for Parents, Mary Baratta-Lorton, Addison Wesley Pub. Co., p. 46 TB: What Color is Your World? Gill, Ivan Yablonsky District Resources

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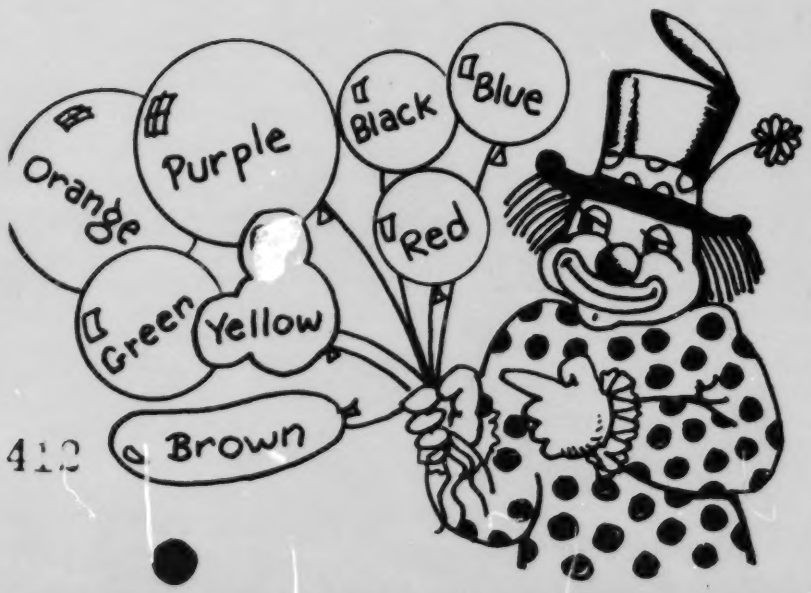
Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources

Title: Balloons
Group Size: entire class
Materials: 8 balloons, each a different color; tickets to match balloon colors; worksheets; crayons

Procedure(s):

- Place the eight balloons around the room.
- Give each student a ticket. The ticket is an invitation to sit near the matching balloon.
- When each student has a place, give each a piece of plain paper.
- The students then draw some balloons.
- Suggest they color balloons any color they wish.
- Variation: Colored fish cut-out with paper clip, magnet and fishing pole--students "fish for colors."

Title: Balloons
Group Size: entire class
Materials: make one large drawing (below) in colors; worksheets for students; crayons



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District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-1

Student Learning Objective(s) A. The student knows the names of primary colors. B. The student knows that color is a property of many objects and substances. C. The student is able to group objects according to color. D. The student is able to group objects by one property.

State Goal	1,9
District Goal	
Program Goal	1,3,7

Related Area(s) Art, Reading

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Put the large drawing on the bulletin board. . Pass out worksheets to each student. . Students color corresponding balloons on their worksheets.	Check student's worksheet to see if he/she colored the balloons correctly.	District Resources

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Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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417

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-1

Student Learning Objective(s) A. The student knows the names of primary colors. B. The student knows that color is a property of many objects and substances. C. The student is able to group objects according to color. D. The student is able to group objects by one property.

State Goal	1,9
District Goal	
Program Goal	1,3,7

Related Area(s) Art, Reading

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Put the large drawing on the bulletin board. . Pass out worksheets to each student. . Students color corresponding balloons on their worksheets.	Check student's worksheet to see if he/she colored the balloons correctly.	District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-1

Student Learning Objective(s) A. The student knows the names of primary colors. B. The student knows that color is a property of many objects and substances. C. The student is able to group objects according to color. D. The student is able to group objects by one property.

State Goal 1,9

District Goal

Program Goal 1,3,7

Related Area(s) Art, Reading

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Put the large drawing on the bulletin board. . Pass out worksheets to each student. . Students color corresponding balloons on their worksheets.	Check student's worksheet to see if he/she colored the balloons correctly.	District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-1

Student Learning Objective(s) A. The student knows the names of primary colors. B. The student knows that color is a property of many objects and substances. C. The student is able to group objects according to color. D. The student is able to group objects by one property.

State Goal	1,9
District Goal	
Program Goal	1,3,7

Related Area(s) Art, Reading

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Put the large drawing on the bulletin board. . Pass out worksheets to each student. . Students color corresponding balloons on their worksheets.	Check student's worksheet to see if he/she colored the balloons correctly.	District Resources

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Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

423

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-2

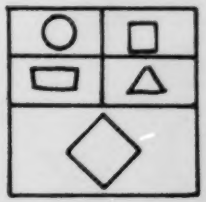
Student Learning Objective(s) A. The student knows the names of primary shapes, e.g., square, circle, triangle, rectangle, diamond. B. The student knows that shape is a property of many objects. C. The student is able to group objects according to shape. D. The student is able to reproduce a shape when given its name. E. The student is able to group objects by one property.

State Goal	1
District Goal	
Program Goal	3

Related Area(s) Math, Symmetry, Science Reading

Suggested Activities: Grade(s) K-1

Title: Feel the Shape
Group Size: small group or entire class
Materials: glitter, yarn or fine sand, solid geometric shaped objects



Procedure(s):

- Distribute objects to class.
- Call on students to name the shapes for the class.
- If not, introduce the names.
- In small groups, students outline shapes with glue and glitter on a piece of paper. (Be careful to put glue just inside the lines on the shapes.)
- When papers are dry, students trace around shapes gently with fingers, as teacher reviews shapes.
- Variation: Make shapes with yarn glued to paper.

Suggested Monitoring Procedures

Have student name shape when shown the tagboard shape.

Possible Resources

TR: Program in Science, Houghton Mifflin Co.

TR: Exploring Science (Orange Book), Laidlaw Brothers

TB: Workjobs, Mary Baratta-Lorton, Addison-Wesley Co.

TB: Everything Has a Shape and Everything Has a Size, by Bernice Kohn, Prentice Hall

TB: My Very First Book of Shapes, Eric Carle, Thomas Y. Crowell

TB: "Wheel is Round" song from Lutes and Tunes, songbook by Malvina Reynolds

TB: The Great Perpetual Learning Machine, Jim Blake & Barbara Ernst, Little, Brown & Co., p. 177-186

F: Intro. Shapes, Lines, & Angles, Coronet

G: Playshapes, Patterson Blick, Available from Pacific Science Center

G: Geometric Domino, Available from Pacific Science Center

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Sock Boxes Group Size: individuals Materials: five oatmeal boxes (decorated with shapes), two sets of tagboard shapes (circles, squares, rectangles, triangles, diamonds), cuffs from socks. Cut off cuffs and place over opening of boxes. Procedure(s): . Put one shape in each box (can have several sizes of some shape in each box). . Leave one example of each shape out for use in matching. . Student puts hand in box and feels the shape. . Student puts matching shape on top of box. Title: Shape Train Group Size: individuals or small group Materials: shape train (engine and 5 cars made from milk cartons with one shape on each car); several sets of small tagboard shapes, small pictures on tagboard, small objects (blocks, balls, jar lids, washers) Procedure(s): . Student places object according to shape in the car marked with that shape. Title: Geoboards Group Size: individuals or small groups Materials: Geoboard, rubber bands, pegs, yarn Procedure(s): . Student makes shapes with rubber bands, pegs and yarn.	Observe and check off as mastered. Given the name of a shape, the student can draw the shape.	District Resources

SMALL SCHOOLS PROJECT

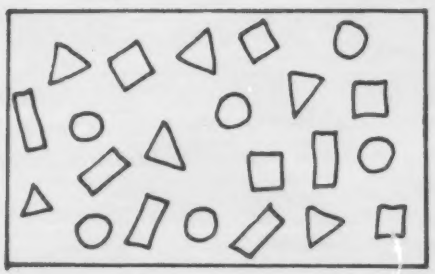
Suggested Objective Placement K-2

Student Learning Objective(s) A. The student knows the names of primary shapes, e.g., square, circle, triangle, rectangle, diamond. B. The student knows that shape is a property of many objects. C. The student is able to group objects according to shape. D. The student is able to reproduce a shape when given its name. E. The student is able to group objects by one property.

State Goal	1
District Goal	
Program Goal	3

Related Area(s) Math, Symmetry, Science Reading

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Finding Shapes Group Size: small or large groups Materials: none needed Procedure(s): . Take students outside and have them find objects shaped like a circle, rectangle, triangle and square. (Can also be done in the room.) . Discuss the objects they have found that were these shapes.		TR: Beginnings, SCIS, Rand McNally TR: Project Learning Tree, American Forest Institute (available from S.P.I.), "Tree Shapes, Natural and Unnatural," p. 34
Title: Shape Hop Group Size: small groups Materials: one 10'x3' strip of butcher paper, red permanent marking pen. Teacher draws shapes 10" in diameter randomly on the sheet (or shapes are placed on floor instead of butcher paper).	Observe students playing game. Watch for students who make errors.	District Resources



Suggested Activities: Grade(s) 1-2	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Have students take off their shoes. . Play the game with the students. Give directions to students: Step on the squares only. Step on the rectangles only. Step on the circles only. . The student who steps off the proper shape or who does not name the shape correctly is out. . Variation: Add numbers and colors to the shapes.		District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-2

Student Learning Objective(s) A. The student knows the names of primary shapes, e.g., square, circle, triangle, rectangle, diamond. B. The student knows that shape is a property of many objects. C. The student is able to group objects according to shape. D. The student is able to reproduce a shape when given its name. E. The student is able to group objects by one property.

State Goal	1
District Goal	
Program Goal	3

Related Area(s) Math, Symmetry, Science Reading

Suggested Activities: Grade(s) 1-2

Title: Shadow Clues
Group Size: large group
Materials: overhead projector, geometric shapes (cone, sphere, cube, parallelogram, cylinder--baseball, box, can, tube)

Procedure(s):
- Use an overhead to project shadow shapes.
- Have students put shapes on overhead to project shadows.
- Students will discover circle, square, rectangle, and triangle.
- Discuss the shadows made by objects.
- Variation: "Squeaky" Game -- hide mouse behind felt shapes on flannel board. Children must name the shape in order to look underneath. The one who finds "Squeaky" is next to hide him.

Title: Shapes in Nature
Group Size: small groups
Materials: apple, cucumber or banana (cylinder), carrot (cone), cheese (rectangle), bouillon cube, cutting board, knife, toothpicks

Procedure(s):
- Teacher slices objects.
- Small groups of students observe and then handle the slices.
- Discuss shapes before and after slicing.
- Circular slices can be re-formed into original shapes by fastening slices together with toothpicks.

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Suggested Monitoring Procedures

Have the student identify the shape by name when teacher points it out.

Use a checklist to see when student masters activity.

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Possible Resources

TB: Workjobs for Parents, Mary Baratta-Lorton, Addison-Wesley, p. 36, 66

K: Creative Moments, Creative Studies, Inc., "Shape Up Your Garden"

District Resources

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Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-1

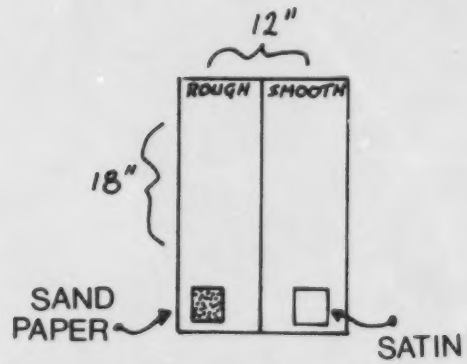
Student Learning Objective(s) A. The student knows that texture is a property of objects and substances, e.g., rough, smooth. B. The student is able to group objects by texture. C. The student is able to group objects by one property.

State Goal 1

District Goal

Program Goal 2

Related Area(s) Art

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Rough and Smooth Group Size: small groups Materials: assorted pictures of objects of rough and smooth texture on tagboard (covered with contact paper), container for pictures.  Procedure(s): . Student feels objects to determine whether the object is rough or smooth, then places it on the appropriate side of the answer board. . Variation: Student may also cut pictures from magazines and write the category by each picture. Later collages may be made of the objects and/or pictures.	Observe and check off when student masters activity. The student can state whether a given sample is rough or smooth.	TR: Workjobs, Mary Baratta-Lorton, Addison-Wesley Pub. Co., p. 40 TB: Textures, Broadatz, Dover Publications Fs: The Feel of Your Skin, Jam Handy magazines (pictures) District Resources

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Hard and Soft Group Size: small groups Materials: hard or soft objects, tagboard Hard / Soft hammer / shirt chest / grapes chair / bread money / sweater soap / feather mirror / teddy bear cup / kitten turtle / pillow shell / slippers bone / towels seashell / yarn marbles / snowman telephone Procedure(s): . Student takes objects and sorts them into correct side of answer board. . When student can read, he/she can sort words into hard/soft. (Example: cat, rock.)	Observe and check off when student masters activity. Student can state whether a given sample is either hard or soft.	
Title: Feely Board Group Size: small groups Materials: 18"x24" tagboard, two sets of materials (identical) glued to 3"x5" pieces of heavy cardboard; one set is glued to the answer board. Elastic, macaroni, velvet, sandpaper, heavy plastic, corrugated paper, sponge, packing plastic (air bubbles), wire screening, satin, container for second set of objects. Procedure(s): . Blindfold a student. The student then matches each card to its mate on the answer board by feeling the textures.	Observe and check off when student masters activity.	District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-1

Student Learning Objective(s) A. The student knows that texture is a property of objects and substances, e.g., rough, smooth. B. The student is able to group objects by texture. C. The student is able to group objects by one property.

State Goal	1
District Goal	
Program Goal	2

Related Area(s) Art

Suggested Activities: Grade(s) 1

Title: Shiny and Smooth
Group Size: small group
Materials: squares of 2"x2" waxed paper and paper towelling, plastic wrap, foil, one large sheet of paper for each student

wax paper

- ☐ shinier / smoother ☐ paper towel
- ☐ shinier / smoother ☐ foil
- ☐ shinier / smoother ☐ plastic wrap

Procedure(s):

- Student pastes squares onto sheet of paper, pairing waxed paper with others.
- Student then draws line from descriptive words to the sample it matches.

Suggested Monitoring Procedures

Observe and record when student masters activity.

Possible Resources

TR: Beginnings, SCIS, Rand McNally

District Resources

416

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Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-1

Student Learning Objective(s) A. The student knows that taste is a property of many substances.

B. The student is able to group objects by one property.

State Goal	1
District Goal	
Program Goal	1,2

Related Area(s) Language Arts, Art, Cooking

Suggested Activities: Grade(s) K-2

Title: Sour
Group Size: entire class
Materials: lemons, knife

Procedure(s):

- Teacher shows a lemon to the students and asks what they can tell about it. They may first refer to its color, shape, texture or size. If necessary, ask what they think it would taste like. Ask what they mean by "sour."
- Cut the lemons and let the students taste them.
- Other suggestions:
  1. Same procedure, but use sweet objects and salty objects.
  2. Have students draw pictures of faces to show sour, sweet and salty.
  3. Have students make up poems to tell about sweet, sour or salty.

Title: Discriminating Tastes
Group Size: entire class
Materials: 30 paper napkins, 8 slices of bland bread, lemon juice, 1 container of salt, 1 container of sugar

Procedure(s):

- Give each student a quarter slice of bread on a paper napkin. Tell the students to break the bread into four pieces and eat one piece.

Suggested Monitoring Procedures

Give food other than bread (e.g., unsalted popcorn, crackers etc.), and have students predict what will happen when salt, sugar or lemon is added to the item. Students will verify predictions.

Possible Resources

TR: Science--A Process Approach II, Mod. 7, p. 3 (Ginn)

F: You and Your Sense of Taste and Smell, Disney

Fs: Tasting with Your Tongue, Jam Handy

District Resources

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451

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
. Ask: "Does it taste like lemon? How can we make it taste like lemon?" . Put some lemon juice on one piece for each student. . "Now does it taste like lemon?" . Repeat the process with salt and then sugar. Discussion: . How was the taste of the bread changed? . How would you describe the four bites? (plain, sour, salty, sweet) Title: Tasting Party Group Size: entire class Materials: edible food samples brought from home by students and teacher Procedure(s): . Ask students to bring something from home that they think the others may not have tasted before. . Students taste each item and classify as to sweet, sour, salty or bitter. . Emphasize: Student should not taste anything unless he/she knows that it is safe to do so.	Observe and check off students' responses.	District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-1

Student Learning Objective(s) A. The student knows that odor is a property of many substances.

State Goal 2,4

District Goal

Program Goal 2,7

Related Area(s) Safety/Health, Cooking

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Odor Differentiation Group Size: small groups Materials: baby food jars (painted red or blue) with perforated lids, cotton balls, perfume or shaving lotion, worksheets with jar outlines drawn on them, crayons, blindfolds Procedure(s): . Each student puts on a blindfold. . Let the students smell the perfume. Discuss. Repeat with other odors. Ask students to identify what they smell.	Observe student's responses on worksheets.	TR: Science--A Process Approach II, Mod. 15 AAA Observing p. 3 extra suggestions on p. 5 Ginn and Company TR: Beginnings, SCIS, Rand McNally Fs: How Your Nose Knows, Jam Handy TR: Using Our Senses, Minnimast
Title: Safe to Taste or Not? Group Size: small group or entire class Materials: baby food jars covered with paper, lids, cotton balls, vanilla extract, furniture oil (not lemon scented), bleach, cherry-flavored drink, orange juice, turpentine Procedure(s): . Teacher puts several drops of each substance on a cotton ball and puts a cotton ball in each jar. . Have students identify in class discussion which odors indicate a food odor or a cleaner (yuk) odor. . Stress the danger of tasting unsafe substances. . Extension: Students can place Mr. Yuk stickers on pictures of dangerous substances.	Observe student responses.	District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-1

Student Learning Objective(s) A. The student knows weight is a property of objects. B. The student is able to group objects by weight. C. The student is able to group objects by one property.

State Goal 1

District Goal

Program Goal 1

Related Area(s) Math

Suggested Activities: Grade(s) K-1

Title: Weight Boxes
Group Size: small groups
Materials: tagboard squares, felt marking pen, answer board, spray paint, container for cards and weights, 8 containers of equal size, dirt or gravel. Fill the 8 containers with dirt or gravel, putting equal amounts in pairs of containers. The difference in amounts should be great enough to be easily detected (one pair can be empty, one pair can have ¼ cup dirt mixed with water, another with 3/4 cup mixed with water and the last 1¼ cup. Spray paint (or wrap with paper) containers to hide the dirt level.

Procedure(s):

- Student sorts through the weight boxes to find the pairs of identical weight. He/she puts each pair on a separate answer board.
- Student having difficulty may use simple balance to weigh the pairs, while one who does the job easily may arrange the pairs in order according to graduated weight.

Discussion:

- See if you can find the pairs that are the same weight and put them together.

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Suggested Monitoring Procedures

Have students respond to discussion questions.

219

Possible Resources

TB: Workjobs, M. Baratta-Lorton, Addison-Wesley Pub. Co., p. 29

K: Creative Moments, Creative Studies, Inc., "What Equals Two Marbles?"

TR: Primary Balancing, ESS, McGraw-Hill

District Resources

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Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
. What have you been doing? . Which pairs are the heaviest? Which are the lightest? . Would a lemon be heavier or lighter than this weight? . Can you find something in the classroom that is the same weight as this one? . Pick up two weights and show me the heavier one. Title: Simple Balance for Comparing Objects by Weight Group Size: small groups Materials: seesaw Procedure(s): . Take students to playground. Choose several pairs of students to demonstrate how those of similar weight can balance each other, but those of different weight cannot. . Ask students to think of some ways in which a balanced pair can be unbalanced and some ways an unbalanced pair can be balanced. . Relate to teeter-totter. . Variation: You may wish to choose a sufficient number of students to balance your weight.		TR: Space-Time-Energy-Matter (STEM) Elementary School Science, Addison-Wesley Pub. Co., Sand Hill Road, Menlo Park, Ca. 94025 TB: Weighing and Balancing, Jane Srivastava, Thomas Y. Crowell Co. District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-1

Student Learning Objective(s) A. The student knows weight is a property of objects. B. The student is able to group objects by weight. C. The student is able to group objects by one property.

State Goal	1
District Goal	
Program Goal	1

Related Area(s) Math

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Weight Surprises Group Size: class or Learning Center Materials: fishing sinkers, metal bookends, plastic objects, wood objects, nuts, bolts, anything else that is available, optional--balance scale Procedure(s): . Arrange sample by pairs that differ greatly in overall size but have similar weights, or where the larger object is actually lighter than the smaller one. Discussion: . Ask students to predict which is heavier. Test their predictions by using the balance scale or by lifting them. . Variations: Students could draw pictures of heaviest object in each pair. A ditto could be made for students to mark the heaviest or lightest. Students could record the weight of each object, using the balance scale.	The student predicts which object is heavier and verifies his/her prediction by experimentation.	TR: STEM, Addison-Wesley Pub. Co. District Resources

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Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-1

Student Learning Objective(s) A. The student knows that size is a property of objects.

B. The student is able to group objects according to size.

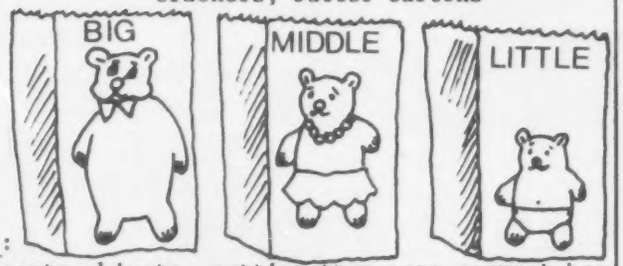
State Goal 1

District Goal

Program Goal 3

Related Area(s) Math

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Bolt Board Group Size: small groups Materials: 5 small nuts and bolts, 5 medium-sized nuts and bolts, 5 large nuts and bolts, blindfold, container for bolts, 1"x1"x3' board, glue. Glue nuts to the board. Procedure(s): . Ask students to look at the bolts. Decide if any bolts fit nuts; try to guess which nut it fits and place nut in front of bolt it fits. . Now screw bolt into nut. . Put all bolts into nuts. . After students become proficient, have two work together. . Blindfold one student and see how fast he/she can get the right nuts and bolts together. Title: Button Game Group Size: small group Materials: apple crate separator or egg carton, 100 buttons in matched sets, 5 or 10 containers for buttons. Procedure(s): . Student sorts buttons by size group, putting each group in one section.	Observe and check off when student masters activity.	District Resources

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Supermarket Group Size: small group Materials: 3 paper bags marked Big, Middle, Little (with drawings of Papa, Mama and Baby Bear on them), a series of objects of various sizes, e.g., cans of different sizes, boxes such as cereal, crackers, butter cartons  Procedure(s): . Student sorts objects, putting them into correct bag.		TR: Workjobs For Parents, Mary Baratta-Lorton, Addison-Wesley, p. 33
Title: Classify Shapes Group Size: entire class Materials: sheets of white paper with different size shapes drawn on them, colored paper, scissors, paste Procedure(s): . Student cuts shapes out of colored paper to match a selected size and pastes them onto the correct size shape on the white paper.		District Resources
Title: How Big Group Size: entire class Materials: enough pictures of different size objects for entire class Procedure(s): . Teacher holds up a picture, and asks for someone to hold up a picture of something bigger (or smaller) than the object shown in the teacher's picture. All those with an appropriate picture hold up an example.	Observe and check off when student masters activity.	

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows that solids occupy space, have a definite shape, and have mass. B. The student is able to demonstrate that an object's form can change while its material composition remains the same.

State Goal	1,4
District Goal	
Program Goal	1,2,3

Related Area(s) Math, Language Arts, Art

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Marbles, Sands and Jars Group Size: entire class, then individuals Materials: sand, glass marbles, eight glasses Procedure(s): . Have one student fill a glass with sand and try to add marbles. They roll off. . Conclusion: Glass is full of sand. Sand is a solid. . Have same student take another glass and fill it with marbles. Then have student pour sand in the glass. Ask: "Is there space for sand?" Answer: "Yes, because sand is smaller than marbles." . Conclusions: Some solids (according to shape) fill up the same space in a different way. There was space between marbles for the sand, so there was still space in the glass. Discussion: . Can you add marbles to the glass of sand? . Can you add sand to a glass full of marbles? . While the glass is empty, is there anything in it? . Variations: Use wooden blocks, popcorn and salt.	Have students respond to discussion questions. Have student touch objects on his/her desk which are solid. Have student explain why he/she thinks the objects are solid. Ask: "How could we get the marbles to occupy more space in the glass?"	TR: STEM (Space, Time, Energy and Matter), Addison-Wesley Co., pp. 42-43 TR: SCIS, Ginn and Co., P. O. Box 2649 Columbus, Ohio 43216 TR: Workjobs for Parents, Mary Baratta-Lorton, Addison-Wesley, p. 23 Fs: Intro. to Volume, Pop. Sci. Pub. Co.
Title: Metal and Wood Grab Bag Group Size: small Materials: 1 empty grab bag; wood objects--4 different kinds and 4 different of each kind; metal objects--4 different kinds and 4 different of each kind.	Make an array of objects from the grab bag and have student match them for you.	District Resources

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Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Place four pieces of each kind of wood and metal in the empty grab bag. . Each student draws five objects from the bag without looking into it and puts together any two that are alike in all properties. The matched pairs are put aside. . The game proceeds with each student in turn drawing one object and returning one to the bag. New pairs may be matched as additional objects are drawn. . The first player who has all his objects in matched pairs wins. On the winning play, no object will be returned as six objects are matched.		
Title: Comparing Wood in Different Forms Group Size: small group or large, depending on quantity of materials Materials: Balsa wood, magnifiers, sandpaper, cardboard trays Procedure(s): . Give each student a piece of Balsa wood, sandpaper and a tray. Ask him/her to change the wood into wood dust. . Have students examine the sanded wood and wood dust with fingers and magnifiers. Discussion: . How is the dust and wood different? . How are they the same? . Help the students to understand they only changed the appearance of the wood, but it is still the same material.	Demonstrate how an object's form can change while its material composition remains the same. Have students respond to the discussion questions.	District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows that liquids take the shape of their containers, occupy space and have mass.

State Goal 1,4,5

District Goal

Program Goal 1,6,7

Related Area(s) Math, Social Studies

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources

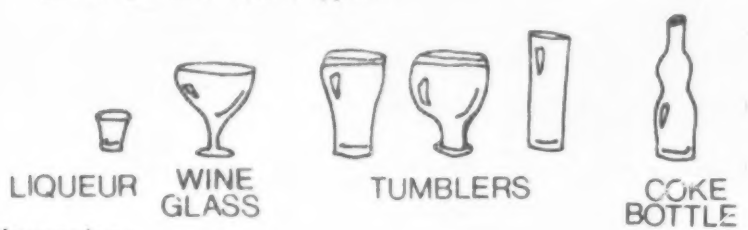
Title: Liquids, Water, Glasses and Shapes

Group Size: entire class or groups of 6 students (combined demonstration by teacher and students)

Materials: 6 glasses of varying shapes, plastic pitcher of water, sack of marbles

Procedure(s):

- Have student fill glass with water and ask: "Is it full?" Answer: "Yes, full of water." Water is a liquid (wet, pour).
- Have 5 more students fill each varied glass and Coke bottle. Explain to students that the water (liquid) is in a different shape. Therefore, liquids take the shape of things (the containers) they are in.
- If we add something else to the container, e.g., a marble, what will happen?



Discussion:

- What shape is the water in the wine glass?
- Is the water in the Coke bottle the shape of the bottle?

Suggested Monitoring Procedures

Have students fill the varied glasses.

In response to discussion, students will say that the glass is full, that water (liquid) takes the shape of the holder (container) and fills it.

Possible Resources

District Resources

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
. Are the shapes different? . Are the spaces in the bottle full? . Are the spaces in the glasses full? . Are the shapes of the glasses and the bottle different? . Is there space in the water? . Add some alcohol to another "full" glass of water. . What happened? . Add sugar.		District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows that gases take the shape of their containers, occupy all the space in their containers, and have mass.

State Goal	1,2
District Goal	
Program Goal	1,2,6

Related Area(s)

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Bubbles and Space Group Size: 1st grade--6 students; 3rd grade--entire class Materials: liquid soap, 1 tsp. per jar; 1 tbls. water; 1 jar (6-8 oz.) per student; plastic straws--2 per student; aluminum foil for tops or baby food jar tops, soda straws Procedure--Part I . Students blow through a soda straw into mixture of liquid soap water until jar is full of bubbles. Discussion: . What happened to soap? Answer: It turned to bubbles. . What made it turn to bubbles? Answer: We blew air--breath into it. . What can you call air, breath? Answer: Gas . Did it fill jar? Answer: Yes Procedure--Part II . Set jar in high, safe place for twenty minutes. By this time bubbles should have subsided. Jars are still closed. Discussion: . What happened to the bubbles? Answer: They're gone. . Where did they go? The jar is closed tight. Answers: (Maybe) It's on top of the soap. It's air in the jar. It's still there. . Try to establish with the students that the soap is still there and that the gas filling bubbles is still there filling the jar.	Have students tell why the soap expanded to fill jars. Have students say that the air and soap remain in jar in both forms--bubbles, water; soap, water.	Fs: Balloons and Bubbles, Troll Assoc. District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows that gases take the shape of their containers, occupy all the space in their containers, and have mass.

State Goal	1,2
District Goal	
Program Goal	1,2,6

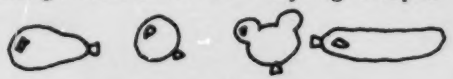
Related Area(s) Math, Language Arts

Suggested Activities: Grade(s) 2-3

Title: Gas Has Mass and Fills All The Space (inside the balloon)

Group Size: entire class

Materials: enough balloons of varying shapes



and rubber bands for entire class (class 21-24), 1 or 2 pins

Procedure(s):

- Teacher should pull and stretch balloons before class starts in order to make exercise easier.
- Each student blows his/her balloon and fastens it with rubber band.

Discussion:

- What made the balloon fill up? (Varying answers--wind, breath, maybe even CO_2, O_2?)
- Can you see what you blew in? (No--your breath)
- Does balloon look different?
- Conclusions:
  1. Balloons are full of air, breath, etc.
  2. Name of stuff balloon is full of is gas--it is not water, sand. It's air, breath, gas.
  3. The gas took the shape of all these different shaped balloons.
     Other suggestions: Blow up varying shapes of small and large paper bags.
  4. Pop balloons--Where did air, gas go?
  5. Do step four but pop with bags.
  6. Conclusion: Something gaseous was in balloon or bag. Now it is back in the room someplace but we cannot see it.

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Suggested Monitoring Procedures

Questions: Informal, ongoing assessment, during activity.

Have students tell what filled the balloons. The students will tell that gas (air) took the varying balloon shapes. They will tell what happened to the air (gas) when the balloon was broken.

Possible Resources

F: Simple Demonstrations With Air, Coronet

FL: Gases and Airs, Eye Gate House

TR: Practical Guide to First Grade Activities, "Air Is Pushy," Milliken Publishing Company, pp. 117-118

District Resources

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Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources
		District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

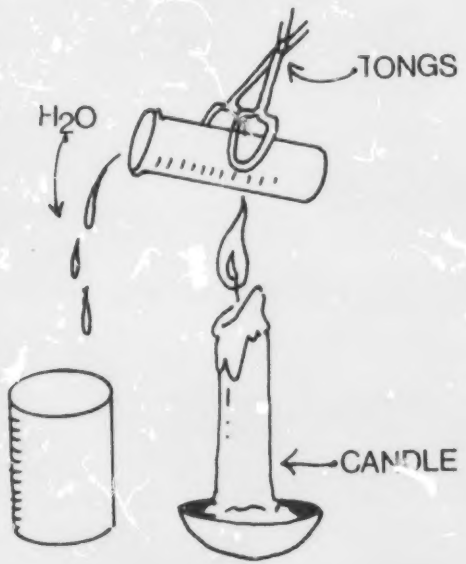
Student Learning Objective(s) A. The student knows that gases take the shape of their containers, occupy all the space in their containers, and have mass. B. The student is able to demonstrate that an object's form can change while its material composition remains the same.

State Goal	1,2
District Goal	
Program Goal	1,2,6

Related Area(s) Math, Language Arts

Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources
Title: Changing a Liquid From Liquid to Gas Back to Liquid Group Size: entire class Materials: ice cubes, candle, small pan, test tube with 1 hole stopper, glass tube to fit tube stopper, graduated cup or beaker (small), matches, tongs to hold test tube (See illustration on following page.) Procedure(s): . Display and discuss ice cubes, e.g., "What is ice?" (solid water). . "What happens to ice if it gets warm?" Put ice in pan and melt. . Pour melted ice into graduated cup and measure the amount of liquid. . "What happens if we heat water?" Put water into test tube and light candle. (Some students will know that the water will turn into gas.) . Attach 1 hole stopper and glass tube to test tube and heat. Water will turn to gas and condense back into water in tube. Collect water in a small beaker. . Measure the amount of water that has returned to emphasize that the shape changed but the liquid's composition stayed the same. (See Page 234 for illustration)	Have students devise another method of doing the same thing and have them explain how it would work.	District Resources

Suggested Activities: Grade(s) 3	Suggested Monitoring Procedures	Possible Resources



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District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student is able to group objects by more than one property.

B. The student is able to compare properties of objects.

State Goal 9

District Goal

Program Goal 2,3,5

Related Area(s) Art, Math

Suggested Activities: Grade(s) K-1

Title: Button Game
Group Size: small groups
Materials: apple crate separator or egg carton, 100 buttons in matched sets of 5 or 10, container for buttons.

Procedure(s):
- Student sorts buttons into piles.
- Encourage student to use his/her own criteria for grouping buttons. These may be by color, size, style, texture, how many holes, etc.
- Student may group sets one way and then re-group another way.

Title: Macaroni Pieces
Group Size: small group
Materials: various types of pasta such as twists, shells, noodles, etc., in different colors, food coloring-stain pasta pieces different colors

Procedure(s):
- Student arranges the pasta in groups based on more than one property, e.g., color, size or shape.

Title: Sorting
Group Size: entire class
Materials: objects in the classroom

Procedure(s):
- Have students collect things from around the room. They sort the objects using two characteristics (use size and color, e.g., piles of short yellow objects, little green things, etc.).

Suggested Monitoring Procedures

Observe and check off when student masters task.

Observe students' groupings. Ask why they made particular groups.

Possible Resources

TR: Workjobs, M. Baratta-Lorton, Addison-Wesley Co., p. 46

TR: Attribute Games and Problems Webster-McGraw Hill

G: "The Classification Game," Instructo Activity Kit, The Instructo Corp., Paoli, Pa.

District Resources

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
. The students will find that things may be shifted from one pile to another as they are sorted by different characteristics. . Note: Teacher may have to collect appropriate objects in advance and place them around the room.		

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District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student is able to group objects by more than one property. B. The student is able to compare properties of objects. C. The student values properties as a means of identification. D. The student values the use of properties in describing objects and organisms.

State Goal 9

District Goal

Program Goal 2,3,5

Related Area(s) Art, Math

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Title: Rock Scramble Group Size: entire class Materials: rocks brought by students and teacher Procedure(s): . Students place rocks in a pile in the middle of the room. . Teacher says: "Find your rocks." Students try to pick out their own rock. . Put the rocks back in the pile. . Teacher and students arrange rocks according to color, size, or some other way. Then ask: "Can you now find your rock?" Discussion: . How does sorting help you find things?		District Resources

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Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student is able to group objects by more than one property.

B. The student is able to compare properties of objects.

State Goal 9

District Goal

Program Goal 1,7

Related Area(s) Art, Math

Suggested Activities: Grade(s) 2-3

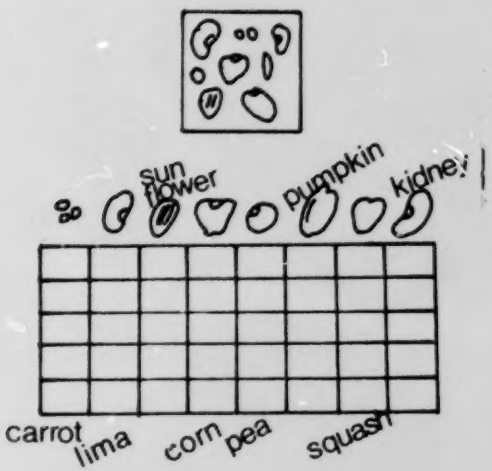
Title: Seed Variation
Group Size: grade 3--whole class
Materials: several different kinds of seeds and one to six of each kind

Procedure(s):

. Students make a histogram and then read the information from it. They record number, kind, relative size, color of seeds.

There are many kinds of seeds. Here are a few. Examine the collection. How many kinds are shown? How many are there of each kind? Record the numbers on a histogram.

Color square per each seed.



Suggested Monitoring Procedures

Check students' histogram.

Possible Resources

TR: Modular Activities Program in Science (M.A.P.S.), Houghton-Mifflin, Publishers

District Resources

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Discussion: . How are the seeds alike? . How many seeds in the collection? . What kind of seed was found most often?		

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student is able to demonstrate that an object's form can change while its material composition remains the same.

State Goal 1,2

District Goal

Program Goal 5

Related Area(s) Art

Suggested Activities: Grade(s) 2-3

Title: Is Water Lost?
Group Size: 2 or 3 students to do or as a total demonstration
Materials: large plastic jar, ice cubes, scale that weighs in pounds and kilograms

Procedure(s):
- Put the jar on the scale and add ice cubes to jar until scale reads 500 grams. Add lid. Weigh jar + ice + lid. Students make a record of the weight.
- Put jar in a warm place. Leave it just long enough to melt all the ice.
- Weigh jar. Record weight.

Discussion:
- Was any water lost?
- What evidence do you have for your answer?

Title: Mixing and Separating
Group Size: total class demonstration
Materials: 1 cup of sugar, metal pie pan, water, hot plate, spoon

Procedure(s):
- Place sugar in metal pie pan. Have students taste, touch and feel the sugar. Students write down what the sugar feels and tastes like.
- Mix water with sugar and stir until sugar has dissolved. Have students taste and feel this mixture and record similarities and differences.
- Place mixture on hot plate and heat. Heat mixture until water has evaporated. Allow time for complete cooling. Have students touch, taste and feel, and

592

Suggested Monitoring Procedures

Probe students' responses to discussion questions.

Possible Resources

TR: Concepts in Science, Newton, Level 3

District Resources

593

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
record similarities and differences between first sugar and last sugar. Discussion: . Has the sugar changed?		

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-2

Student Learning Objective(s) A. The student is able to demonstrate that some objects float in water and some sink.

State Goal	9
District Goal	
Program Goal	1,7

Related Area(s)

Suggested Activities: Grade(s) K-1

Title: Clay Boats
Group Size: entire class--work in small groups
Materials: plastic boxes, modeling clay, trays, multi-purpose balance, pails, wax paper, sponges, plastic bags, water, sponges, dowels or round pencils, paper towels, medicine cups, fishing sinkers.

Procedure(s):

- Fill pails with lukewarm water and put them on the floor.
- Give each student 1 oz. of clay and have them roll it into a ball.
- Ask: "What will happen when the clay is put in the water?" Discuss it and then put clay in water and see what happens.
- Discuss with students ways we could make it float. Try ideas suggested, e.g., flat--have students see if they can make it float; then suggest they roll it with a pencil and see what happens.
- Eventually, they will come up with making boats. Have students draw picture on graph paper of what their float turned out to be.

Discussion:

- See if they can improve on their boats.
- See if boats will hold fishing sinkers.
- Use medicine cups--repeat activities.

Suggested Monitoring Procedures

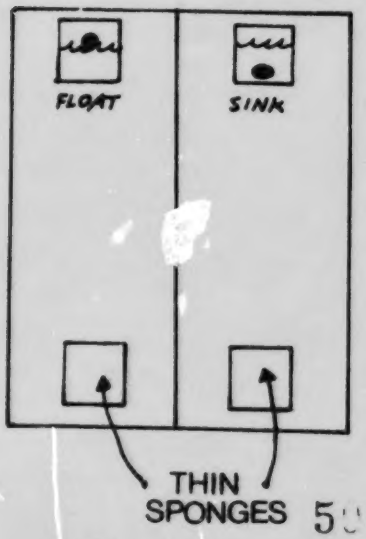
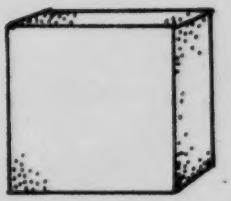
Have student construct a clay boat from a 1 oz. piece of clay.

Have student identify and/or describe those shapes that float best in a container of water. The student will sketch or draw pictures of his floating clay shapes.

Possible Resources

TR: Clay Boats, Elementary Science Study, McGraw Hill
TR: Workjobs for Parents, Mary Baratta-Lorton, Addison-Wesley, p. 44

District Resources

Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
. Use various size containers and repeat. . Give 6-inch square of aluminum to student and see if it will float--repeat activities. Title: Float or Sink Group Size: small groups Materials: plastic box or bucket to hold water, prepare heavy tagboard covered with clear contact paper-masking tape around edges; thin sponge; water; box of assorted objects--some should look identical, but one should have floating properties and the other not, e.g., Ivory and Camay soap; ebony and pine wood pieces; plastic; polyethylene, acrylic, pieces of metal. Procedure(s): . Student experiments to see if objects float in the box of water. He/she then places the object on the correct side of the answer board.   PLASTIC BOX filled with water	Observe and check off when student does activity.	TR: Workjobs, Addison-Wesley Pub. Co. TR: Science in Elementary Education, Peter C. Gega, John Wiley & Sons, p. 268 District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-2

Student Learning Objective(s) A. The student is able to demonstrate that some objects float in water and some sink.

State Goal	9
District Goal	
Program Goal	1,7

Related Area(s)

Suggested Activities: Grade(s) 2-3

Title: Colored Solutions
Group Size: entire class or Learning Center
Materials: 1 plastic mold consisting of three hollow hemispheres; 1 plastic tray (meat); 4 plastic tubes 1"x2½"; 2 plastic eyedroppers; food color--red, blue, green; coarse salt

Procedure(s):

- Give each student a set of materials. A large meat tray will keep desks clean. Put several large pails of water around room to quickly change water.
- First Look: "What do you think will happen if you add a drop of food coloring to water?" Let students experiment and then discuss what happened. Then discuss what would happen if you used hot water--cold water; if you mixed colors; if you stirred solution; if you added salt to water.
- Second Look: Experiment with hot and cold water using *sideways dropper for hot and cold. Use different color for hot and cold. Add hot to cold, cold to hot. Then using empty tube, try mixing to determine which would remain on top. Have students see if they can keep layers separate. Must be very careful when adding second color not to stir or squeeze too hard as you will get a mixed color rather than layers.

* Sideways dropper: Fold over nozzle part of plastic eyedropper. Using scissors, cut off a small piece

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Suggested Monitoring Procedures

Have student describe the behavior of a drop of food coloring in water both before it is stirred and after stirring.

Have student describe the result of mixing drops of different colors in the same tube of water.

Possible Resources

TR: Colored Solutions, Elementary Science Study, McGraw Hill

K: Creative Moments, Creative Studies, Inc., "Funny Weigh"

District Resources

511

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
of the folded part where the nozzle enlarges to form the tube. Plug end of tube with piece of wooden match. . Third Look: Salt, water and food coloring are needed with this activity. Begin activity by asking what will happen when we add salt to water. Summary of activities: By mixing salt, water and food coloring, some students will discover that drops of food coloring float in a salt solution instead of sinking as they did in plain water. Others will find that is possible to float colored water on a salt solution and make colored liquid layers. Some students will probably become involved in other activities, such as finding out how much salt will dissolve in a given amount of liquid, how fast the salt dissolves, and how fast colored layer spreads. When over, discuss results of various experiments.	Given a problem related to the mixing rate of food coloring in liquids, have student identify two variables that might be involved.	District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student values properties as a means of identification.

B. The student values the use of properties in describing objects and organisms.

State Goal 1,8

District Goal

Program Goal 1,2,3

Related Area(s) Language Arts

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Guessing? Group Size: entire class Materials: none needed Procedure(s): . One student will describe an object using color, shape, size, weight, words, etc. Other students will identify the object.	Observe students' behaviors and responses in discussions, e.g., "What if clouds were green? If we were blind, how would we know what things are?" etc.	District Resources

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Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

516

517

SUBJECT: Science

SPECIFIC AREA: Symmetry

	Page	Suggested Grade Placement	District Placement K	1	2	3	4
The student knows:							
. symmetry means correspondence in size, shape and relative position of parts on opposite sides of a dividing line, in a repeated sequence, or about a center or axis.	251-	K-3					
. the primary aspect of symmetry is balance.	255-	K-1					
. bilateral symmetry means matching on both sides of a center line.	263	1-3					
. rotational symmetry means matching of the original pattern as an object is turned around its center.	265	1-3					
. translational symmetry means repetition of pattern in a sequence.	267	1-3					
The student is able to:							
. identify symmetrical and nonsymmetrical patterns.	251-	K-2					
. classify objects and/or organisms as examples of bilateral, rotational or translational symmetry.	267	2-3					
. identify corresponding elements in symmetrical patterns.	255-	1-3					
. construct elements or parts to complete symmetrical patterns.	271-	K-3					
The student values:							
. symmetry in nature.	251-	K-3					
. symmetry of man-made objects.	255-	K-3					
. symmetry as an aspect of beauty.	271	K-3					

OPTIONAL GOALS AND ACTIVITIES

PHYSICAL EDUCATION	MUSIC	SOCIAL STUDIES
ART	LANGUAGE ARTS	MATH
SCIENCE	HEALTH	READING
CAREER EDUCATION	ENVIRONMENTAL EDUCATION	OTHER _____

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows symmetry means correspondence in size, shape and relative position of parts on opposite sides of a dividing line, in a repeated sequence, or about a center axis. B. The student is able to identify symmetrical and non-symmetrical patterns. C. The student values symmetry in nature.

State Goal	1,4,9
District Goal	
Program Goal	1,3,7

Related Area(s) Art, Math

Suggested Activities: Grade(s) K-3	Suggested Monitoring Procedures	Possible Resources
Title: Symmetry Group Size: entire class Materials: overhead projector, leaves Procedure(s): . Have the whole class take a walk around the school grounds, and observe repeating patterns in tree leaves, sidewalks, etc. . Bring leaves into class. Use the overhead projector so all the students may see the leaf lines. . Make rubbings from leaves. . Variation: Limit objects to sameness of size and shape on opposite sides of a dividing line. 1. Cut shapes at fold of paper. 2. Complete patterns with flannel shapes. 3. Ask students to fold shapes and material objects in half to determine symmetry.	Have students redefine symmetry (with teacher's help in discussion) as matching things and patterns in things.	TB: What Is Symmetry? Mindel and Harry Sitomer, Thomas Y. Crowell Co. F: Symmetry, Seattle Public Library Prism Kaleidoscopes (2 sizes) Otagiri Mercantile, Available from Pacific Science Center District Resources

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522

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

523

District Resources
524

SMALL SCHOOLS PROJECT

Suggested Objective Placement 2-3

Student Learning Objective(s) A. The student knows symmetry means correspondence in size, shape and relative position of parts on the opposite sides of a dividing line, in a repeated sequence or about a center or axis. B. The student is able to identify symmetrical and non-symmetrical patterns.

State Goal 1,4,9

District Goal

Program Goal 1,3,7

Related Area(s) Math, Art

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Symmetry - general Group Size: entire class Materials: outside - take a walk around the school grounds Procedure(s): . Look for repeating patterns in leaves, trees and sidewalks. . Pick up leaves and make rubbings. (For the entire class use the overhead projector--so all the students can see the leaves.)	Have the students redefine symmetry as matching items and patterns.	F: Symmetry, Classroom (time) District Resources

525

526

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

527

523

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows that the primary aspect of symmetry is balance. B. The student is able to identify corresponding elements in symmetrical patterns. C. The student values symmetry in man-made objects.

State Goal	1,4,8,9
District Goal	
Program Goal	3,6,7

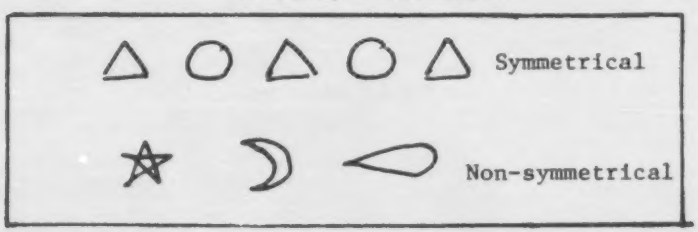
Related Area(s) Art, Math

Suggested Activities: Grade(s) K-1

Title: Symmetrical and Non-symmetrical Patterns

Group Size: entire class

Materials: colored chalk, blackboard, entire classroom windows, ceiling tiles, patterns on students' shirts, dresses, worksheets.



Procedure(s):

- Talk about symmetry (patterns), look at windows, barbed wire fences, steps, buildings, tiles, etc.
- Talk about examples of symmetry in humans - two eyes, ears, arms, legs, four toes, five fingers, etc.
- Discuss non-symmetrical items such as examples on the bulletin boards, weather-charts, etc.

Suggested Monitoring Procedures

Have students give examples of symmetry in man-made objects. Have students give examples of non-symmetrical design in man-made objects.

Possible Resources

TR: Introducing Symmetry - Unit 7 - Minnemast (Minnesota Math and Science Teaching Project), 720 Washington Ave. S.E., Minneapolis, Minnesota 55414

K: "Mirror Cards," ESS, McGraw Hill

K: "Triangle Cards," Selective Education Equipment, Newton, Mass.

TB: The Magic Mirror Book, Marion Walter, Scholastic Book Service

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Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) The student is able to identify corresponding elements in symmetrical patterns.

State Goal	9,1
District Goal	
Program Goal	1,2,3

Related Area(s) Math, Art

Suggested Activities: Grade(s) K-1

Title: Which Beads Match? (Color and Shape)
Group Size: six students or entire class
Materials: blackboard (entire class), patterned cards (group of six students in center), sets of colored beads: □ squares - red, ○ circles - green, △ triangle - yellow; cards, string and stick on shapes.

Procedure(s):
. Make this pattern:

△ □ □ ○ △ □ □ ○

(with the stick on shapes or beads on string)
What is alike in this pattern?
Answer: The yellow triangle
Answer: The red square

Discussion:
. We can pick out matching parts two ways - by shape and color.

Title: Finding Patterns
Group Size: entire class
Materials: overhead projector, transparencies

Procedure(s):
. Make transparencies of symmetrical patterns - a bead, flowers, leaves, etc., - whole and with missing parts. Show quickly and ask questions on what is missing.

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Suggested Monitoring Procedures

Have students copy a pattern-shaped beads from a given card pattern.

Given two colors (red and yellow) of one shape (square), have the students make a symmetrical pattern on felt board.

Given two shapes △ and □ of two colors (red △, yellow □), have the student make a pattern on felt board and thus identify properties for classification.

Possible Resources

F: Discovering Creative Patterns, BFA Ed. Media

K: "Attribute Blocks," Elementary Science Study, McGraw Hill Book Co.

District Resources

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Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 1-3

Student Learning Objective(s) The student is able to identify corresponding elements in symmetrical patterns.

State Goal	9,1
District Goal	
Program Goal	1,2,3

Related Area(s)

Suggested Activities: Grade(s) 1	Suggested Monitoring Procedures	Possible Resources
Title: Which Beads Match? (Color & Shape) Group Size: small - six students or entire class Materials: blackboard (entire class), patterned cards (group of six students in center). □ squares-red, ○ circles - green, △ - yellow; string, stick on shapes Procedure(s): . Make this pattern: △ □ □ ○ △ □ □ ○ (with the stick on shapes or beads on strings) . What is alike in this pattern? Answer: "The yellow triangle." Answer: "The red square." Discussion: . We can pick out matching parts two ways - by shape and color. Title: Finding Patterns Group Size: entire class Materials: overhead projector, transparencies Procedure(s): . Make transparencies of symmetrical patterns - a bead, flowers, leaves, etc. - whole and with missing parts. Show quickly and ask questions on what is missing.	Have the students copy a pattern --shaped bead from a design on a card given him/her by the teacher. Give the student two colors of one shape (red & yellow) squares and have him/her make a symmetrical pattern on felt board. Given two shapes △ and □ of two colors (red △, yellow □), the student will make a pattern on felt board and thus identify two properties for classification.	District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 1-3

Student Learning Objective(s) A. The student is able to identify corresponding elements in symmetrical patterns. B. The student values symmetry of man-made objects.

State Goal 9,1

District Goal

Program Goal 1,2,3

Related Area(s) Math

Suggested Activities: Grade(s) 2-3

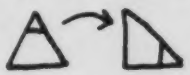
Title: Turning Blocks
Group Size: entire class
Materials: one pair of triangular blocks for each student, one pair of square blocks for each student. (blocks of the same size in pairs, but different pairs may be of different sizes), masking tape, assorted blocks.

Procedure(s):

- One corner of each triangle or square block should be marked with masking tape. The tape is used to track the position of the block and show which surface of the block is the front. This is important because in testing for rotation-symmetry, the pattern must not be turned over to bring the back side up.
- Have each student place one of his/her triangular blocks on top of the other with the taped corners matching. Then turn the top block until it fits the bottom block again. Do not turn it over. Repeat this process using the square blocks.

Discussion:

- Question: "Did you turn the top block a whole turn?"
  Answer: "No, only part of a turn," or "No, only one third of a turn."
  Say: "Turn the top block more until it again fits the bottom block."
  Question: "Have you turned it a whole turn now?"



541

Suggested Monitoring Procedures

See discussion.
Probe the students' responses.
Have the students repeat the process with a different shape wheel by themselves.

Have the students repeat the process with cut felt flower petals on a felt board.

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Possible Resources

TR: Minnemast, Exploring Symmetrical Patterns, pp. 18

District Resources

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Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 1-3

Student Learning Objective(s) A. The student knows that bilateral symmetry means matching on both sides of a center line. B. The student is able to classify objects and/or organisms as examples of bilateral, rotational or translational symmetry. C. The student values symmetry in nature.

State Goal	1-3
District Goal	
Program Goal	1

Related Area(s) Art, Math, Music

Suggested Activities: Grade(s) 2-3

Title: Faces And Hand
Group Size: entire class
Materials: two pictures of a cat's face, one with a line down the center, ruler

Procedure(s):

- Show the picture of the complete cat's face to the class. Point to the appropriate parts as you ask the following questions:
  (a) "Does each side of the face have an eye?" (Yes)
  (b) "Does each side have an ear?" (Yes)
  (c) "Is each ear the same distance from the center of the face?" (Yes. Trace the center of the picture with your finger)
  (d) "Does the cat's face have a kind of balance? For each part on one side is there a part like it on the other side?"
  (e) "Are the two halves of the face exactly alike?"
- Cut the second picture in two, partially down the center. Demonstrate that if the faces were exactly the same you could interchange them and they would look exactly the same as before.
- Each side of the cat's face is like the other, but in the opposite order (just like our hands). This is a special kind of symmetry called Bilateral symmetry.
- Discuss other things that have bilateral symmetry.
- Variation: Cut the cat's face in half, then, place one of the halves against a mirror (pocket size) and compare with a picture of the whole (cat) face.

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Suggested Monitoring Procedures

Possible Resources

TR: Introducing Symmetry, Minnemast

TB: Mirror Magic, Janet S. Abbott, Lyons and Carnahan

K: "Mirror Cards," Elementary Science Study, McGraw Hill Pub. Co.

District Resources

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Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Folding Test For Bilateral Symmetry Group Size: individual or entire class Materials: pictures of objects--some bilateral, some not Procedure(s): . Have the students write names of pictures on their papers. . Fold each paper down the center and ask: "Are the sides alike in the opposite order?" Record "yes" or "no" on paper for each picture. Title: Keep The Symmetry Group Size: Learning Center or entire class Materials: flannel board with sets of objects from which patterns can be made, e.g., property blocks, checkers, paper clips, flannel shapes, design sheet: one per student Procedure(s): . Make a simple, bilaterally symmetric pattern on the flannel board. You may mark the line of symmetry with a string. . "Can anyone add to the pattern and keep it bilaterally symmetric?" (Get a volunteer) 517 . Have students make their own designs on paper.	Take notes of students' own designs.	TR: Science in Elementary Education, Peter C. Gega, John Wiley & Sons, p. 134 District Resources 513

SMALL SCHOOLS PROJECT

Suggested Objective Placement 1-3

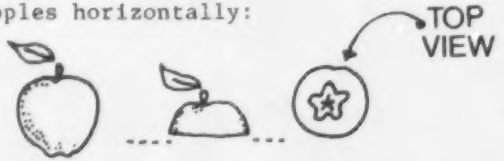
Student Learning Objective(s) A. The student knows that rotational symmetry means matching of the original pattern as an object is turned around its center. B. The student is able to identify corresponding elements in symmetrical patterns.

State Goal 1

District Goal

Program Goal 1,3,4

Related Area(s) Math, Art, Reading

Suggested Activities: Grade(s) 1	Suggested Monitoring Procedures	Possible Resources
Title: The Star In The Apple Group Size: small groups of 4 Materials: apples, knife, tempera paint, liquid starch and construction paper Procedure(s): . Cut the apples horizontally:  Discussion: . "Can you see the star in the apple?" Answer: "Yes" Question: "Now turn the apple around - is the star different?" . Show the students how to cut the apple vertically. . The students will observe both apples and notice the differences in appearance. . Have them point out which halves show the star. . Ask the students to turn the apple and notice the rotational symmetry.	Ask the students to draw an apple with a five part star included. Have the students find other examples of rotational symmetry in nature.	Story - Little Red House Check the school library. This reference is widely distributed, source unknown. TB: Look Again, Tana Hoban, The MacMillan Co.

District Resources

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Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement 1-3

Student Learning Objective(s) A. The student knows that translational symmetry means repetition of a pattern in a sequence. B. The student is able to classify objects and/or organisms as examples of bilateral, rotational, or translational symmetry. C. The student values symmetry as an aspect of beauty.

State Goal 1,4

District Goal

Program Goal 2,3,5

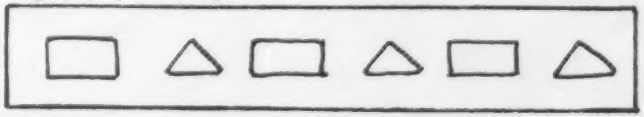
Related Area(s) Math, Art

Suggested Activities: Grade(s) 1-2

Title: Paper Doll Chain
Group Size: large or small group
Materials: paper, scissors and papershapes.

Procedure(s):

. Discuss repeating pattern of two's with examples, e.g., paper shapes.



. Students cut out paper dolls using folded paper and scissors.

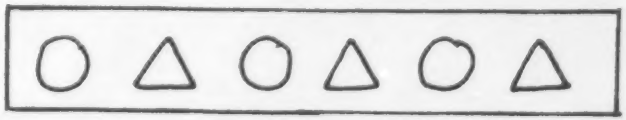
Discussion:

. Are paper dolls a repeating pattern?
. Prove to us it is. (Student cuts one doll off the end - places it over each of the other dolls in the chain).

Title: Keep The Pattern
Group Size: large group and individual
Materials: sets of objects from which patterns can be made, e.g., property blocks, beads to string, pegs for pegboard, flannel shapes.

Procedure(s):

. Teacher makes a repeating pattern on the chalkboard or by using blocks.



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Suggested Monitoring Procedures

Probe student responses to questions asked during the activity.

Provide additional instruction as necessary.

Have the students put a different set of objects in a repeating pattern.

Possible Resources

TR: Minnemast, Introducing Symmetry; Minnesota Mathematics and Science Teaching Project

District Resources

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Suggested Activities: Grade(s) 1-2	Suggested Monitoring Procedures	Possible Resources
. Ask: "Can anyone add another shape and keep the pattern repeating?" . Students now work individually with blocks or beads and make any pattern they wish by repeating their basic designs over and over. Title: Find the Repeating Patterns Group Size: entire class Materials: objects, pictures, designs that show repeating patterns, e.g., animal tracks, fence, chain (metal or paper), strip of lace, a bead necklace, piano keyboard. Procedure(s): . Students look for repeating patterns in the classroom. Many are "planted" for them to find. Discussion: . "What did you find?" Title: Paper Chains Group Size: small group (4) Materials: two colors of construction, e.g., red and green paper cut in strips, scissors Procedure(s): . Students make repeating patterns of their own. Title: Printing Group Size: small group (4) Materials: construction paper, tempera paint (several colors), small objects. e.g., spool, nail, block, eraser, thumb, fingers, bottle caps Procedure(s): . Student selects objects with which to make a repeating pattern. Student dips the object in paint and then on paper. Color can also be used as a pattern.	Show the students a picture and have them find examples of translational symmetry. Prepare a bulletin board of printed figures.	District Resources

SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student knows that the primary aspect of symmetry is balance.

B. The student is able to classify objects and/or organisms as examples of bilateral, rotational, or translational symmetry.

State Goal	1,4,9
District Goal	
Program Goal	1,3,7

Related Area(s) Math, Art

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: Make, Match and Turn Group Size: entire class Materials: felt triangles of varied sizes, (3-large, small and medium, for demonstration), paper triangles in 3 sizes - small, medium and large, dittoed on vari-colored construction paper, scissors, paste Procedure(s): . Use two triangles of matching size and make six pointed (rotational) stars. ✡	Have the student make ✡ six pointed star patterns and rotate them on paper. Have the student describe how they made the stars. ✡ The students will see by experimentation why they must use △ triangles of matching sizes for each pattern.	District Resources

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Suggested Activities: Grade(s) ____	Suggested Monitoring Procedures	Possible Resources

District Resources

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SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) The student is able to construct elements or parts to complete symmetrical patterns.

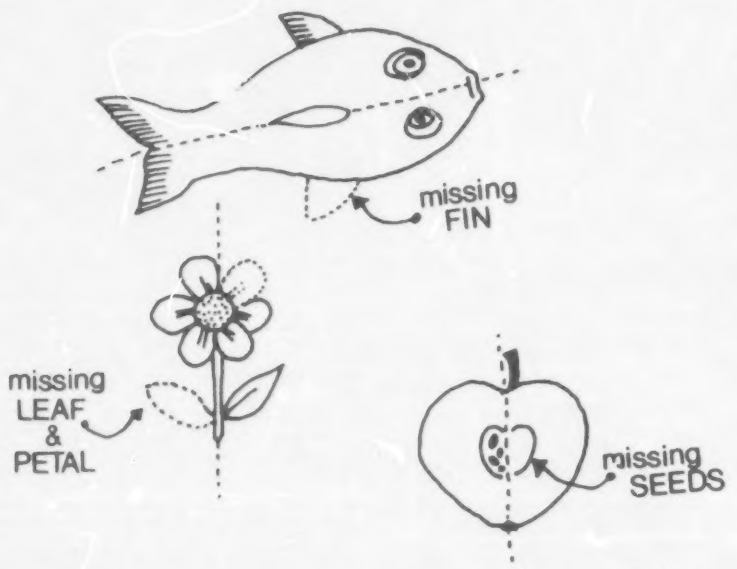
State Goal	9,1
District Goal	
Program Goal	7

Related Area(s) Art, Math

Suggested Activities: Grade(s) K-1

Title: What Is Missing?
Group Size: entire class or small groups
Materials: colored worksheets, scissors, paste, colored overhead transparencies and overhead projector.
Teacher prepares:

Vary by leaving out the eye.



561

Suggested Monitoring Procedures

Give the students different unfinished paper figures of animals and people and have them replace the missing part from a box of paper parts.

Given dittoes as examples of bilateral symmetry with missing part, have the students draw in the missing part.

Possible Resources

TR: Modular Activites Program In Science

K: Objects, Tracks, Shapes & Changes

District Resources

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Suggested Activities: Grade(s) K-1	Suggested Monitoring Procedures	Possible Resources
Procedure(s): . Show transparencies to the class and tell them the basic element of symmetry is balance. Discussion: . Ask: "What part is missing?" (Do this for each transparency.)		

District Resources

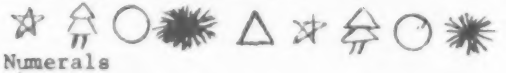
SMALL SCHOOLS PROJECT

Suggested Objective Placement K-3

Student Learning Objective(s) A. The student is able to construct elements or parts to complete symmetrical patterns. B. The student values symmetry as an aspect of beauty.

State Goal	9,1
District Goal	
Program Goal	1,2,3

Related Area(s) Math, Art, Language Arts

Suggested Activities: Grade(s) 2-3	Suggested Monitoring Procedures	Possible Resources
Title: What Comes Next In The Pattern? Group Size: entire class - or small groups in centers (4-6 students). Materials: chalk, blackboard, ditto paper, pencils Rotational flower Long, repetitive pattern  Numerals 1 2 3 4, 1 3 4, 2 3 . Procedure(s): . Show example on the blackboard. . Invite the students to fill in the patterns. . Distribute worksheets with missing figures, pattern parts, numeral or letter. (Letters: a-c-e, f-h-j.)	Give students dittoed samples of rotational symmetry and have them fill in the missing parts. Have the students make patterns (repetitive-linear) with given shapes on felt board. Using numerals have the students make patterns on blackboard.	District Resources

Suggested Activities: Grade(s) _____	Suggested Monitoring Procedures	Possible Resources

District Resources